FIRE INSURANCE AND HOW TO BUILD

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COMBINING ALSO A GUIDE TO INSURANCE AGENTS RESPECTING FIRE PREVENTION AND EXTINCTION, SPECIAL FEATURES OF MANUFACTURING RISKS, WRITING OF POLICIES, ADJUSTMENT OF LOSSES, ETC., ETC.

BY

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PREFACE.

Twenty-five years ago, after six continuous years of revision of my manuscript, after careful study of the subject and a wide canvass for expert judgment and criticism, I published a work entitled "Fire Insurance and Causes of Fires." It met with a success beyond my anticipations, and the favor with which it was received by underwriters throughout the country has encouraged me, at this later date, when I have had a quarter of a century of further opportunity for observation and study, to put forth the following pages.

If this work fails to secure the approval of my readers, I can still feel myself their debtor for past favors, and comfort myself with the reflection that, at least, its compilation of important facts and happenings may furnish foundation for others to build upon, and so prove a benefit to the business of insurance—a business worthy of the best efforts of its ablest men, who will continue to work out the problem of adjusting its methods and economies to a point where it will be no greater tax upon the community than is necessary to protect that community from its most insidious and destructive enemy.

F. C. M.

New York, January, 1903.

THEORY OF FIRE INSURANCE, AND ITS RELATION TO THE COMMUNITY.

It is, of course, unnecessary to explain to an insurance agent that the "premium" is the amount paid an insurance company for assuming a fire risk; that the "rate" is the charge per one hundred dollars of insurance, fixed according to the construction of the building, its occupation, environment and facilities, public and private, for extinguishing fires; that the "policy" is the contract written and issued by the insurance company, through its agent, to the property-owner; that the "policy register" is the book in which the agent keeps the record of his policies, making a full copy of the written portion of each; that the "daily report" is the blank on which he reports taking the risks to the company, giving a full copy of the written portion of the policy and a diagram of the building and the surrounding buildings or "exposures" and other facts called for on the blank, and that this must be mailed on the day the insurance is made binding, so that the company may be advised promptly, in order that it may write or telegraph if it has information at its home office prejudicial to the acceptance of it; and that the "monthly report" is the report to be sent to the company on the first of the month, giving a full report of all the policies issued during the preceding month, with a check or draft to balance.

It is not generally understood that a policy of insurance is not an agreement to pay a stipulated sum in the shape of liquidated damages in case the subject of insurance is destroyed by fire, but is simply an undertaking on the part of the insurance company, as the printed part of the policy states, to indemnify the owner to the extent of his loss in actual value damaged or destroyed; the amount of insurance named in the policy and paid for at the rate of premium being a limit of claim, and not a measure of it. There is, therefore, no "abandonment" in fire insurance, by

which is meant the right of a property-owner to turn over what is left in the way of salvage to the company and demand a full payment of the policy. This is a feature of marine insurance, but not of fire insurance. The owner is obliged, according to the terms of his policy, to take care of all damaged property and to preserve it from further injury.

The "rate" of premium or price charged by the company is not based upon the expectation of burning of a particular risk insured, but upon the number of risks of like kind which would be burned or damaged out of say a thousand in any single year. At a rate of one per cent, for example, a thousand risks, each insured for a thousand dollars, would yield ten thousand dollars in premium; if ten risks out of the thousand should burn in a year, the entire amount of premium would be required to pay the loss. It is evident that a smaller number than ten must burn or a higher rate than one per cent must be obtained to provide for expenses, in addition to losses. The rate of premium, therefore, for any class of risks—dwellings, churches, schools, &c.,—should be the "fire cost" of the class, i. e., the amount of loss for a year on each one hundred dollars of amount at risk; to which should be added a sufficient sum to pay the expenses of conducting the business—commission of agents, salaries of officers and other employees, cost of blanks, inspections, taxes, &c., &c. —and a further sum to represent a fair return on the capital of the stockholders paid in by them and placed at the risk of the business. There should be at least five per cent profit for the stockholders on the amount of premiums received, and a further five per cent laid aside for meeting exceptional conflagrations, like those of Chicago and Boston. There was not a single large company doing business in the city of Chicago in 1871 which did not lose all of its net surplus, while most of them lost in addition a portion of their capital. As some of them had been doing business for twenty years or more, this shows that five per cent is not too large a sum to set aside for such exceptional fires.

Luck in Fire Insurance. There is absolutely no such thing as luck as to fire losses, or as to the percentage of loss to amount insured in the case of a large fire insurance company intelligently managed, and conducting its operations over a field wide enough for the laws of average. The probabilities of the burning or

escape of a single building are, of course, uncertain and would afford to a gambler the basis for a wager, but the probabilities of the burning of one or more buildings out of ten thousand of the same construction, occupancy, fire-extinguishing appliances, management, moral hazard and environment may be matters of ascertained certainty. There would, in fact, be less element of chance or luck in the matter by far than in the rise or fall of values of the necessaries of life in the markets of the world. Indeed, I doubt if those in any business could count with such certainty as to its ups and downs of trade as can underwriters with regard to the fluctuations of loss for each hundred dollars of amount at risk.

With a small company, doing business in a restricted territory, or a large company taking an unduly large line upon a single risk, the element of luck becomes a factor. An excessive line on a single risk is like a mountain peak rising above the level of an extended plain, conspicuous for its prominence. Any company taking large lines must be careful to see that it has enough of them to make a second or third average on a higher level. If its average of lines on a given class of hazards is $10,000 in amount and it has a $100,000 line on a single risk of the same class, it is conducting its business on a gambling basis, instead of on an underwriting basis.

It is due, probably, to a mistaken view of this important fact, rather than to any other consideration, that the rates on risks of some classes have been inadequate, through a competition which has been more greedy than discreet.

The writer once heard an underwriter remark, in commenting on the sufficiency of a rate on a special hazard, that it would burn just as easily at 5% as at 2%, and this he regarded as an intelligent view of the case. He failed to see, that while this was a fact, one loss on a thousand risks at 2% would be a very different affair, when he came to balance his accounts, from one loss on a thousand risks at 5%.

It may safely be said that the underwriting of to-day is growing, year by year, to closer lines, requiring more careful inspection and a better knowledge of fire cost, and that the days when an underwriter needed only a shovel to take in premiums, the average of which would be high enough to cover all mistakes

and to make up for inadequate rates on exceptional classes, have gone by forever. There is absolutely no luck, good or bad, in fire insurance, and the underwriter who contends for and acts on an opposite theory would do well to sell his stock and get into some other business.

To ascertain the average percentage of loss on the various classes of risks, a comparison of experience of a sufficient number of companies doing a general and large business throughout the country is necessary in the case of most hazards, for the obvious reason that one company would not have enough of any one class of risks on its books, outside of such large classes as dwelling houses, farm buildings, churches, &c., especially in single States, to indicate the expectation of what might be termed the "fire mortality," or the loss on the class. This consideration alone is sufficient to indicate the mistake of confining the business of an insurance company to a single city or limited territory, as it would deprive the company of a sufficient average; and any legislation, therefore, which prohibits a conference of companies for comparing their experience, in order to ascertain adequate and equitable rates, is subversive of the principles of insurance.

It might happen, and often does, that a single company in a single state, or a single company throughout the United States, would show a loss on a certain class of hazards at the same time that the experience of all companies put together would show a fair profit at the rate obtained.

The writer found that in the case of whiskey in brick warehouses, the company with which he is connected, and which too had an exceptionally broad general experience, incurred losses on this particular class, during a five year period, in the two states of Kentucky and Tennessee, in excess of the premiums taken. Such an experience would seem to indicate that the rate obtained, of 90 cents per $100, was too low, whereas the experience of all the companies doing business in the two states named proved that it was sufficiently high, and the rate was not raised. This same company, on the other hand, during the same period, in another section of the country, the Middle States, lost nothing on the same class of risks; an experience which, taken alone, would seem to indicate that the rate obtained was for that locality too high, which was not a fact, however, for the experience

of all the companies doing business in the territory showed the rate had been properly fixed and that the experience of this single company was simply exceptionally unprofitable in the one territory and exceptionally profitable in the other.

No better argument than this could be offered to the legislators of a State to show that laws preventing the conference of companies to secure a broad basis for fixing rates are unjust, not alone to the underwriters, but to the property-owners themselves.

Why cannot an individual insure himself or carry his own risk? The agent is frequently confronted with a proposition on the part of a property-owner, dissatisfied with his rate, that he will carry his own risk. He urges that he has been paying for insurance for a long series of years and has never had a loss. The contention overlooks the fact that, at a rate of one per cent, it would take nearly forty-one years, compounding the interest at 4%, for a sum of money paid at the beginning of each year to equal the principal or sum insured and, therefore, enough to pay a total loss, and this without any allowance whatever for the expense of conducting the business. Anyone can verify this computation for himself. One dollar collected and invested at the beginning of each year, the interest being compounded at 4 per cent., would amount to $98.82 at the end of forty years. Four per cent., it is unnecessary to add, is a larger return of interest than insurance companies receive under existing and proper legislative limitation as to investments in safe securities.

The most reckless gambler would not give such odds as one hundred to one against the happening of a single fire within a period of forty years, knowing the hundreds of ways in which a fire could occur; and the property-owner who carries his own risk is, therefore, taking a chance of losing his all upon odds which a professional gambler would ridicule. In fact, the only individual who can afford to go without insurance and take the risk of the burning of his own property is one—if there be one—who has hundreds of different pieces of property, all of the same average value and so separated that no two could be destroyed by the happening of a single fire. If he is not so situated, fire insurance is necessary for his protection. His commercial credit will be found to depend upon it; no one can afford to sell him goods on time or lend him money if he is not insured, for his

ability to pay would be destroyed by a fire and his creditors would find that they had practically been insuring him themselves, without the compensation that a prudent insurance company, engaged in the business of taking risks, would have charged. The cost of insuring a frame building in a frame neighborhood in localities beyond the protection of fire departments might be 5 per cent. or more; and this being so, the merchant who sells goods to a customer who does not insure would practically be insuring him for nothing but at a cost equal to, or more than, the profit on his sales.

It is this ignorance of the danger of fire, due to the limited experience of a single risk, that leads to mistaken views of Insurance, which requires for its successful conduct as a business sufficient knowledge of all others to estimate properly the fire hazards of their methods. The owner of a saw mill may never have suffered from fire; he would necessarily be ignorant, therefore, as to the causes of fires which have occurred in other mills than his own; but the underwriter, who has had to pay for losses on thousands of properties, is not and cannot afford to be ignorant. It is best for the individual to entrust this branch of his worldly affairs to those who understand it, for the same reason that he entrusts the erection of his building to the architect, carpenter and mason.

CANNOT THE STATE SAFELY CONDUCT THE BUSINESS OF INSURANCE FOR ITS CITIZENS?

Theoretically, yes; but practically nothing would be gained, the chances being largely in favor of a higher cost to citizens and poorer management than would result from the conduct of the business by men engaged in it for a livelihood. The State would need the same clerical and expert labor as would an insurance company. It would require inspectors, adjusters, bookkeepers, and men qualified for the various branches of the business to the same extent that insurance companies would, but with this difference, that these men would too often be appointed for political reasons, rather than because of personal qualifications for the duties to be discharged. Is there more reason why the State should conduct the business of insurance than why it should conduct any other business—that of groceries,

dry goods or manufacturing? It is safe to say that in the distribution of labor in a community the community will regulate itself. *No single calling can secure an undue amount of profit without attracting to it enough competitors from other callings to keep prices at a proper level.*

What would have been the burden of the citizens at large of the two states of Illinois and Massachusetts if they had been called upon to pay the losses of their two cities of Chicago and Boston in the years 1871 and 1872? Fortunately for them the citizens of the entire country, almost of the entire world, contributed, through the fire insurance companies, to pay the millions that were required for the purpose.

PROFITS OF THE INSURANCE BUSINESS.

The rates obtained by insurance companies are sufficient simply to insure the payment of losses and a moderate profit on the capital. *No combination, in any business can possibly be injurious to the public if it furnishes to that public the article produced at the lowest price consistent with fair return upon the capital invested and proper remuneration for the labor employed.* The statistics of all the companies engaged in the business, through a long series of years, show that *the profits of the business of insurance have been less than three per cent. of the premiums collected and that dividends paid to stockholders in excess of that per cent. have been received from interest returns on capital and invested surplus*—an increment which would have come to the owners of such assets, it should be remembered, without placing them at the risk of fire.

The laws of the various States require detailed statements of insurance companies, showing every item of their income and every item of expense; the amount of their premiums received and of losses paid. There is, in fact, no other business whose methods, income, expenses, losses and profits are thus exploited for the information of the public. There are no trade secrets in fire insurance. If the business is conducted at unnecessary expense or with undue profit, the result will be known and invite new companies to enter into competition, and it is impossible for any single company, or any number of insurance companies, to

maintain any form of monopoly.

It is doubtful if any mercantile or manufacturing business could live if obliged thus to publish at the end of each year, for the information of competitors and customers, the fullest details of its transactions. Indeed, if the laws now in force for the regulation of the business of fire insurance—the compulsory publication of accounts, etc.,—were applied to other branches of business, manufacturing and mercantile, the present war against so-called "trusts" and combinations in those branches would be unnecessary.

What, then, has been the protection of the business of fire insurance that it has been able to survive this public exhibit of all the details of its methods and its exact profits? It has been the fact that the profit of the business has been so low as not to encourage the organization of companies. Does not the simple fact that the public shows its unwillingness to invest in insurance stocks on other than a "six per cent. basis," indicate what the published figures of the business clearly prove, that there is no abnormal profit in it and that investors recognize the element of risk and have an apprehension of the facts, or surely the stocks would find purchasers on a lower basis than 6 per cent.? The stocks of well-managed railroads are to-day selling on a 4 per cent. basis.

In connection with this should be taken into consideration that new companies can be easily organized. They have to acquire no "right of way," no franchise or valuable building plant; there are no patent rights or copyrights involved; the necessary capital —and the law does not require a large one,—with a little office furniture and stationery, is all that is needed to launch a new fire insurance company. Much more is required to conduct it at a profit. Surely the written and unwritten law of trade and the rules of competition can be relied upon to regulate the profits of such a business without legislative interference.

ADEQUATE RATES ARE IN THE INTEREST OF THE PUBLIC.

As already stated, the ascertainment of the average percentage of loss, to be correct, involves comparison by insurance companies of their experience, in the interest of the property-owner,

as well as in the interest of the insurance companies; for an inaccurate estimate would be as likely to be too high as too low. If it is too high, the property-owner will be called upon to pay an excessive rate of premium; if it is too low, the company will lose money; and as capital is simply an incident of security, grossly inadequate if the premium should prove insufficient for the risk run, the property-owner would not secure the indemnity he is paying for. The total capital of all the fire insurance companies, domestic and foreign, reporting to the New York Insurance Department at the close of 1900, was less than eighty-nine millions ($88,833,586), while the amount of premiums held by them for their insurance in force was one hundred and fourteen millions of dollars ($114,129,232), whereas *the losses paid for the single year named were eighty-nine millions ($89,566,349), a sum, it will be observed, exceeding the total capital of all the companies engaged in the business.*

This simple but significant fact shows how important it is for the community at large that the average rate of premium of the companies should be high enough to pay the losses and expenses, and that it would not be safe to rely upon the capital as a security. State laws recognize this fact and require that whenever the reserves of a company are not equal to its liabilities so that its capital becomes impaired, the company must immediately make good its capital or retire from business.

PUBLIC PREJUDICE AGAINST CORPORATIONS.

Animosity towards corporations grows largely out of misapprehension in regard to them. The individual citizen does not and should not lose his rights by becoming a member of a corporation any more than by becoming a member of a partnership firm. It is in the power of any citizen to become a shareholder, even though his means are limited. One hundred dollars will buy a share in a new insurance company. For this sum he can engage in a business which he may not understand and secure intelligent management and expert knowledge which he does not himself possess.

Corporations enable people of small means, by joining forces and uniting their savings, to secure the same advantages for business purposes that millionaire capitalists

enjoy; and a corporation thus becomes a poor man's opportunity. Were it not for corporations millionaires would enjoy a monopoly of all large enterprises and would have things their own way. In fact millionaires, if they should act on strictly selfish lines, might well seek to do away with corporations altogether. Among the stockholders of insurance companies, thousands in number, are widows and orphans, who are thus enabled to keep their modest capital employed and to have an active partnership in commercial undertakings.

THE EXPENSE OF THE INSURANCE BUSINESS.

It is, perhaps, not unnatural that property-owners, having in mind only the simple process of writing a policy of insurance by an agent of an insurance company and the delivery of it by him to the assured or property-owner, should regard the expense of transacting the business as merely nominal. They overlook the fact that a greater number of persons of various qualifications must be employed and remunerated before the policy of insurance can be written and delivered by the agent; and that the percentage of the premium required to pay the expenses of the business (about 35 per cent.) is not greater than that involved in the sale of merchandise—a piece of calico, for example, which includes a profit to the planter who raises the cotton; to the compress that presses it; to the commission merchant who sells it; to the common carrier that carries it to the mill; to the mill owner who manufactures it into cloth, including his operatives; to the dye and print establishment that prints it; to the commission merchant in the distributing centre of a great city who sells it; to the wholesale merchant who, in turn, sells to the retailer, who in turn delivers it to the consumer. All of these processes involve separate remunerations and an aggregate percentage of expense fully equal to that of the insurance business, which requires the agent in the town, who writes and delivers the policy of insurance; the expert who inspects the building from time to time during the term of the policy; the rating expert who fixes the rate, recognizing every point of construction, occupancy and environment; the adjuster who must adjust the losses; the accountants and book-keepers in the offices of the company; and, lastly, the executive officers, who must employ all of these men, supervise their work, and attend to the invest-

ment of the assets and reserves of the company, not forgetting office rent, stationery, blank books, printing, postage, and last, but not least, taxes—the latter seldom less than two and a half per cent. of the premium, to be paid whether the company makes money or not. So that it is doubtful if any business involves greater necessary outlay or requires higher executive ability or a broader education as to the methods and hazards of all other occupations.

The expenses of the insurance business, as already stated, will be found to be not far from 35 per cent. Of this sum 15 per cent., would be required for the compensation of the local agents in the cities and towns throughout the country, out of which they have to pay their office rent, and the cost of conveyances for visiting risks to inspect them, some of which would be located in the country on farms, for example. This percentage on the average premiums often amounts after a hard day's labor, in the average town, to little more than the wages of a skilled mechanic. To secure this commission the agent must inspect each building carefully, write and deliver the policy, collect the premium and remit it to the company and report all the facts of the risk to the principal office, maintaining supervision of it throughout the life of the policy in the interest of his company, to detect and report any change or increase in the hazard.

In addition to this percentage paid to the agent, *4½ per cent.* of the premium would be required for adjusters and special agents, traveling inspecting experts, and their hotel and other traveling expenses, for supervising the business, going from agency to agency. In this connection it may be well to state that money expended for inspecting buildings, calling the attention of ignorant or careless property-holders to faults of management or negligence, to faults of construction, etc., etc., all tending to prevent fires, and especially to prevent large or sweeping conflagrations, is money actually expended in the interest of the public—the property-owners themselves.

About *thirteen per cent.* would be necessary to pay the official staff at the principal office, clerks, book-keepers, rent, advertising, postage, expressage, printing, stationery, blank books, etc., etc.

Two and a half per cent. would be required for taxes. In

this connection it will probably surprise those engaged in other lines of business to learn that insurance companies are taxed, not upon the profit of their business, but upon their premiums, which is equivalent to taxing a merchant 2½ per cent. on his sales. It sometimes results that in a state in which the business has been unprofitable, the company actually pays a tax for the privilege, of leaving more money in the state than it takes out of it, and so for the privilege of making a loss.

There have been years when the insurance companies paid taxes amounting to millions of dollars *when their total business showed a loss.*

In 1889	there was a loss of	5,369,983	when a tax was paid of		2,368,360
1891	" " "	9,218,797	"	" "	2,596,902
1892	" " "	6,377,489	"	" "	2,727,974
1893	" " "	10,410,102	"	" "	2,961,571
1898	" " "	1,919,650	"	" "	3,900,134
		$33,296,021			$14,554,941

The ratio of taxes paid to net gain (*i. e.*, excess of premiums over losses and expenses) for the remaining years of the decade, viz., 1888, 1890, 1894, 1895, 1896, and 1897, were as follows:

Year.	No. of Cos.	Ratio of Taxes to Net Gain.
1888	152	323.69
1890	148	88.49
1894	121	28.31
1895	121	33.11
1896	134	25.38
1897	152	36.45

Can any other business show such a burden of taxation?

As the insurance company must collect enough from property-owners to pay its losses and expenses and yield a living profit, it is clear that the citizens of a state, after all, must pay the tax, with the expense of collecting it added—which is a farce. A tax upon the profits, on the other hand, is a tax upon the insurance company that it should pay without complaining; while a tax upon the premium, is a tax upon the assured property-owner and one he ought not to pay. No insurance company would complain of being taxed 2½ per cent. on that portion of the premiums received in a state after deducting the losses and expenses paid to its citizens, and this should be the basis of

taxation everywhere. Certainly the amount paid for fire losses should, at least, be deducted and insurance agents should work to secure this much at the hands of the legislature.

Are Local Boards, Combinations of Fire Underwriters for Rate Making, &c., Inimical to the Interests of Property-holders.

It is hoped that the relation of insurance to the community has been explained in such manner as to secure a negative to this important question and that the following facts have been established.

FIRST—*That Fire Insurance is a commercial and community necessity*:

SECOND—*That a policy of fire insurance is a contract of indemnity; and*

THIRD—*That the reliability of the indemnity depends upon the sufficiency of the rate of premium*; *because*

1. State laws properly require that if the capital is impaired it must be made good, or the company must cease doing business. If companies cannot pay their losses and expenses and secure a fair profit return on the capital adventured they will neither be organized nor continue in business if already organized; therefore, capital is only an incident of the business and an adequate rate is indispensable. Insurance capital must and should have a fair return for the risk run—a law of community.

2. Adequate and equitable rates based upon the merits and demerits of each risk are necessary for the protection of the policy-holder as well as for the protection of the stock-holder. Otherwise the burden of insurance will be unequally distributed and one man's property, if insured below a proper rate, will be protected at the expense of another.

3. As inspection and supervision necessary for the ascertainment of correct rates can be as cheaply performed for one hundred companies insuring a single building or risk as for any one of them, co-operation is advisable to reduce the expense percentage. At the same time it would reduce the loss percentage by securing correction of faults which would cause fires and by encouraging proper construction which would tend

to prevent their spread, and so result in cheaper insurance to property-owners. In this view, co-operation of insurance companies is directly in the interest of the community and should be encouraged and not prohibited. Laws which prevent companies from co-operating in this way, compelling each company to inspect each building for itself, must increase the expenses of transacting the business and result in unnecessarily higher rates of premium.

4. As the labor required to ascertain and fix proper and equitable rates for a building and its contents can be performed by the same expert in the same time for one hundred companies who insure it as for any one of them, co-operation to ascertain and fix rates would result in a saving of this expense also, and so further cheapen the cost of insurance to the property-owner and be directly in the interest of the public.

5. As rates of insurance are based upon the experience of the companies through terms of years on the various classes of hazard, most of which are so few in number that there would not be enough of a class in a single state or on the books of a single company to determine the experience cost of insuring them, the statistics of experience should, in justice to the owners of such risks, be collated from the whole country, and not based upon the abnormal loss ratio of a small class in a single state, which would indicate the necessity for an exorbitant rate on the class in such state, when in fact it might not be necessary.

6. The burden of insurance rates should be graded according to the percentage of insurance carried to value, just as municipal and state taxes are based upon uniform assessments of the same percentage of value; and *the property-owner who insures a proper percentage of his value is entitled to a lower rate than one who insures a small percentage*, there being a difference between the cost of insuring different percentages of value greater even than the difference between that of wholesale and retail prices in mercantile business. Otherwise one class of citizens would be securing insurance at a lower cost than another and, therefore, at the expense of another. It should be borne in mind that insurance is itself a tax, and the cost of the tax should be apportioned fairly or equalized among

all contributing, not only according to faults of construction and other features that add to the hazard of fire, but according to the percentage of the value insured. If, as has been well said, "It would be the height of absurdity for a municipality to attempt to establish and collect a rate of taxation without an assessment of the value of each piece of property taxed, and no community would attempt such an absurdity," it would be an equal absurdity to charge those property-owners who insure only a small percentage of their value at the same rate as those who insure a proper percentage and then base the rate charged to both on the percentage of the total losses to the total premiums, with the inevitable result of placing the burden unduly upon those who have contributed most liberally to the common loss and expense. Co-operation of companies, therefore, is necessary to provide for this in percentage co-insurance clauses in all policies.

It follows, therefore, since co-operation is necessary

To ascertain cost;

To ascertain and secure adequate rates for indemnity;

To prevent fires and thus cheapen the cost of insurance;

To divide and lessen expense and so to further cheapen the cost of insurance;

To secure that the same percentage of insurance should be carried by all owners or a difference in rate made—the principle of co-insurance or average which has always been a feature of marine insurance;

That the conference of insurance companies and their co-operation must be in the interest not only of the companies themselves, but of their customers, the insuring public.

Co-operation in insurance is, therefore, not a "trust," in the modern and ordinary acceptation of the term, by which is meant a combination of those engaged in a particular business to extort improper prices from their fellow-members of the community and so to obtain an undue share of community benefit. There is not now and never has been, any "pooling" in the business of insurance. The ease with which any number of citizens can organize an insurance company will always prevent a monopoly of the business, and those engaged in it can

always be relied upon, in their own interests, to regulate their prices with reference to this important fact. Exorbitant rates and abnormal profits always attract competition, which results in inadequate rates, and those engaged in the business thoroughly understand this. Managed on true underwriting lines, an insurance company is simply a great machine for distributing the burden of the fire loss of the individual citizen among his neighbors throughout the entire country, so that the burden of helping one who is unfortunate will be lightly felt by all. It is the truest and most sensible method of carrying out the scriptural injunction as to the distribution of burthens, and it is amenable to the laws of trade which automatically regulate the profits of all commercial enterprises so that no one class of citizens can long retain any undue advantage of their neighbors or any improper share of the community wealth.*

THE IMPORTANCE OF FIRE INSURANCE.

The Importance of Fire Insurance and its influence upon commerce and manufactures are not generally understood or appreciated. Even the reflecting are apt to think that, because Fire Insurance was almost unknown before the last century, and has only grown to importance within the present one, the business world could dispense with it as easily as did our ancestors. They forget that it has become a necessity of trade; that without its assuring protection, undertakings of the magnitude at present readily assumed, would never be attempted; ventures are made, without hesitation, which would appall those embarking in them if liable to miscarry through a single fire; large values are boldly collected to meet the requirements of commerce, where an accidental conflagration might destroy them in a night; loans are made by the capitalist on insured buildings for many times the value of the land on which they stand, simply because the insurance policy, as collateral between him and loss, makes them valuable for security; merchants sell

*I have drawn largely in the preceding pages on a compilation made by a committee, of which I was chairman, for the purpose of having in our hands, when confronted with adverse legislation, carefully prepared arguments to offer to members of the legislature. The pamphlet is entitled "Fire Insurance," and is published by the National Board of Fire Underwriters. Any agent wishing copies of the pamphlet for use can secure them by writing to the General Agent of the National Board of Fire Underwriters, New York.

their goods on extended credits, knowing that, although the misfortune of fire may overtake the purchaser, his insurance indemnity will enable him to pay for them not less readily than before; vast industries giving employment to thousands of operatives and supporting whole towns by their enterprise, testify not more to the energy of their projectors than to the confidence they repose in the protection which insurance extends to their undertakings, and to-day, insurance is as certainly a necessity of commerce and manufacture as is the railroad or telegraph, or steam-power itself. All transactions of any magnitude recognize it as an essential factor. It is closely and inseparably interwoven with every scheme of profit and trade, a strong, continuous warp-thread which lends security to the fabric and, without which, *it is doubtful if the temerity of capitalists would meet the necessities of the poorer population for employment!*

In this view it becomes a serious question as to what might be the result if this important factor of all business calculations were suddenly to be eliminated; if the wholesale destruction of property, such as occurred at Chicago and Boston, for instance, and which is liable to be repeated elsewere, should, some day, check the recuperative power of companies, *i. e., the inclination of stockholders to advance new capitals.* Can the consequences be even approximately estimated of the sudden and inevitable result of contracted enterprise and over-cautious investment and *the calling in of mortgage loans above the mere value of the land on which expensive structures stand.*

No one can estimate the consequences if a fire, as extensive in the area covered as that of Chicago, should take place in New York—the peculiar resort, for business, of insurance companies—and what city is secure from destruction? Scarcely had the underwriters of Boston ceased congratulating themselves upon their substantial buildings, efficient fire department, and immunity from the high winds of the western metropolis, ere they sank beneath the overwhelming calamity of their own city!

Is the subject not a serious one for the country, and worthy the profound consideration of statesman and financier, of capitalist and laboring man?

If we compare the slow recovery of London from its great

fire of 1666 with the wonderful reproduction of Chicago and the substantial and rapid restoration of Boston, can we doubt that the great recuperative power of both cities was due to their insurance indemnity, and that, without it, they might still be struggling, to attain to the prosperity which they reached within three months after their destruction!

In Chicago alone the amount paid by the underwriters to its citizens was nearly sixty millions of dollars—almost, if not quite, one-half of their entire loss—while in Boston a still larger proportion of the loss was made up by the insurance companies.

Vast and important responsibilities rest upon the officers and agents of insurance companies to so strengthen the companies they represent, not only by avoiding unprofitable risks and inadequate rates, but by the energetic and judicious accumulation of such a number of distributed risks as will enable them to meet exceptional disasters and extraordinary losses.

That he may properly discriminate between safe and unsafe risks, and decide as to adequate rates of premium, it must be evident that the information of an underwriter should be varied and extensive. He should know, if possible, something of every other business whose hazard he undertakes to insure.

There is probably no calling requiring so intimate a knowledge of every other as this. He who assumes the risk of a flour mill, for example, should know more of its dangers than the miller himself. Indeed, it is doubtful if an underwriter can be too well informed on any subject, or that he would be too well qualified for his profession if he could serve a life-time at every other. Drawing a greater number of contracts in a year than do many lawyers in a life-time, and standing often face to face with the most perplexing questions of jurisprudence, it may be questioned if he should know less of law than does the attorney who has made it his profession.

Seriously affected by every discovery of the chemist, and liable, at any moment, to have his chances of loss on whole classes of risks alarmingly increased by new chemical combinations which follow each other as rapidly as the changes of a kaleidoscope, he should know not less of them all than does the chemist himself.

In short, there is scarcely a science, art or manufacture with

which he should not be more or less familiar, and if the successful conduct of any one business or calling requires a life-time of study and application, how much more should the business of insurance—which demands a knowledge more or less intimate of every other—require life-long study and the closest and most constant observation!

In the following pages it has been my aim to place before agents, as briefly as possible, such facts as have been demonstrated in a business extended over the entire country for many years, the statistics of which have been carefully preserved and closely studied. During this time we have had ample opportunity to observe the successes or misfortunes of other companies in the same business, and we think no intelligent agent, *in the conduct of our business at least*, will insist upon substituting for theories of cause and prevention, of profit and loss, of adequate rates and desirable risks, which we present for his consideration and guidance, any opinions he may himself have formed, from a less extensive experience in a more contracted field of observation.

ARRANGEMENT.

While it is hoped that the following work will be found to contain much that will prove interesting to the experienced underwriter, as well as to the unprofessional reader; the arrangement of it, from beginning to end, has been with reference to that natural order or sequence in which an inexperienced agent—one who is just entering upon the duties of his new calling—would be most likely to have occasion to refer to its pages.

In accordance with this plan, the opening chapters after treating of the IMPORTANCE OF FIRE INSURANCE and of the relation of the agent to his company, explain the books, papers and other AGENCY SUPPLIES sent to him as an outfit, including his commission of authority, defining his powers as agent; together with numerous useful hints as to the importance of SOLICITING.

He is, then, instructed as to the INSPECTION OF RISKS; considering, under this head, first, the MORAL HAZARD, or most important feature of a risk and applicant, and, afterward, the PHYSICAL HAZARD—first, as to the *external* physical hazard of

EXPOSURES, which, like the moral hazard, should be satisfactory before the risk itself is entertained—then the *internal* physical hazard of *construction*, *occupation*, and *condition*, as to cleanliness, or negligence of tenants, pointing out the dangers of FIRES FROM CARELESSNESS, SPONTANEOUS COMBUSTION, unsafe KEROSENE, GAS MACHINES, and other CAUSES OF FIRES.

Then follow suggestions as to FIRE DEPARTMENTS and WATER SUPPLY; instructions as to RATES and LINES; instructions as to the WRITING OF POLICIES, with the best methods of insuring the various interests in property; directions as to the manner of REPORTING RISKS TO THE COMPANY, both by daily and monthly report, with full instructions as to the MAKING OF DIAGRAMS and sundry rules governing the conduct of CORRESPONDENCE; instructions as to CANCELATION, where such action may be necessary, and TABLES OF SHORT RATES; directions as to HOW TO PROCEED IN CASE OF FIRE and HOW TO PROCEED IN CASE OF LOSS; followed by explicit instructions as to the INSPECTION OF SPECIAL HAZARDS, with a list of risks, *alphabetically arranged* for reference, showing special features of manufacturing and other hazards; the whole concluding with a collection of FORMS for policies, endorsements, transfers, privileges, etc.

The reader will observe that the arrangement of the work, throughout, is indicated by the running heads of pages and by the "face type," which has been employed to give prominence to the rules and practice of the Company, the smaller type having been reserved for explanations and statistics.

AGENCY SUPPLIES, INSURANCE BLANKS, BOOKS OF ACCOUNT, &c., &c.

It is obviously necessary that an agent should understand the supplies, blanks, &c., furnished him by the company. They are the following:

Commission as Agent.—Some companies require that this should be fastened in the front part of the policy register; others that it should be framed and kept in sight. It should be carefully preserved so that it may be found if, at any time, the company should recall it. It is probably needless to say that the commission defines the powers of the agent, and that if he takes any action which is *ultra vires*, or beyond the powers conferred upon him, he will become responsible to his principal, on the one hand, for any injury it might sustain by his action, and to a claimant, on the other hand, if he should suffer by reason of the assumed powers which the agent does not possess.

Policy Register.—This is a book in which all insurance policies or contracts, renewals and endorsements are to be entered *on the day the insurance is made binding*; and from this entry the policy itself should be copied—a mechanical rule which will insure that a proper record is kept of every transaction. Where the agent writes the policy first and copies it into the register afterwards, there is danger of omitting to make the record. The policy register is the property of the company and is to be considered confidential and must not be exhibited to anyone without the consent or authority of the company.

Policies.—It is probably unnecessary to state that the policy is the form of contract furnished by the company, signed in blank by its officers, but not valid until countersigned by the agent. A careful record of the policies is kept in the office of the company, and the agent should keep them in a safe place where they could not fall into dishonest hands. He is charged with the

number sent him, from time to time, and credited with the number written and with the blanks returned to the company as "spoiled", canceled or "not taken"; the agent being careful to forward such blanks to the company at once.

Daily Reports.—These are blanks for reporting risks to the company. They are self-explanatory, and the instructions on them should be literally followed and all questions answered. The Daily Report should be mailed to the company on the day the risk is made binding, in order that the company may be promptly informed, so that in case its records show reason for declining to insure the party, it may avoid a loss. It is therefore dangerous to delay. If a daily report is not so mailed the name becomes a misnomer.

Monthly Account Blanks.—For reporting the business of the month. Should be forwarded promptly on the last day of the month; not later, in any case, than the first of the month following.

Endorsement Reports.—These are smaller blanks than the daily reports, for reporting all endorsements made upon policies, such as changes of ownership, assignments, removal of property from one building to another, &c.

Expiration Notices.—The best expiration notice for a desirable risk is the renewal itself, or a new policy (where the company does not issue renewal blanks—and most do not), placed by an active agent in the hands of the assured at least thirty days before the expiration of the risk.

Book of Instructions.—This is the property of the company and is to be returned if the agency is withdrawn.

Insurance Maps.—These are made by map companies. The insurance company retains a duplicate, and it is only necessary to refer on the daily report to a building insured by its street and block number to indicate the risk, saving the agent the trouble of making a diagram, *unless some change has been made in the building or its surroundings after the map was issued*, in which case advise the company and send a new diagram to correct the map.

Applications, Surveys. &c.—The company will furnish proper applications for the various kinds of hazards—farm and home-

stead property, dwelling houses, manufacturing risks, &c. An application should in all cases be taken for farm property; companies do not always require one in the case of dwellings, schoolhouses and risks under the immediate and daily supervision of the agent. The agent should remember, however, that personal inspection of every risk is indispensable.

Envelopes.—Large, addressed to company.
Small " "
For policies.
Large plain, for writing to customers.
Small " " " "

Advertising Material.—Will be furnished by the company, including Circulars, in English and German.
Blotting Pads.
Calendars.
Large Show Cards, framed and unframed, for office.
Metal Signs, for the outside of office.
House Plates, &c. These latter are seldom used, except in some localities.

All advertising material should be judiciously used and carefully secured from injury by dust, &c. Requisition should not be made upon the company for material which the agent does not intend to distribute. Otherwise the company will be subjected to an expense which, multiplied by a large number of agencies, would be considerable, and which a loyal agent would wish to save. In making requisitions for supplies the agent should examine the requisition slip of the company carefully to see just what supplies are needed, and the probable quantity, and not order any he cannot use. To save unnecessary postage and express charges, however, a requisition should be complete for all supplies needed or likely to be needed in the immediate future, so as to save the time and expense of later shipments.

Do not pay any express charges on packages received (they are always prepaid), unless the package is needed and the express company refuses to leave it without collecting, in which case take a receipt and forward to the company, explaining the matter, so that it may recover the amount at its principal office.

AGENT'S COMMISSION COMPENSATION.

The commission or compensation allowed to agents by the companies has, for many years, been 15% of the premiums collected. Some companies advocate a mixed or profit-sharing commission, consisting of 10% of the amount of the premium written and a further 15% of the profits at the end of the year, to be computed by deducting from the premiums remitted to the company the losses and expenses incurred at the agency. This would tend to make agents interested in results and would enable those agents who are careful as to inspection and supervision to receive more money than those who are careless or indifferent. The whole matter is naturally the subject of agreement between the agent and his company.

It should be the aim of an agent not merely to seek the better class of risks, but *to induce owners to improve those which are not desirable by reforms in management, construction, &c. He will thus increase his own income and that of his company and benefit the community in which he lives.* An agent can only expect to retain his companies by doing a profitable business for them, and in case he should lose the agency through losses due to his negligence or poor judgment he may find it difficult to secure others. The time lost in trying to induce companies of experience to accept poor, high rated risks which, notwithstanding their high rates, may be unprofitable, will be found to more than balance any extra amount of commission obtained on them.

An examination of the total business of all the companies for years past will show that, at 15%, the commission of the agent amounts to more than three times the average profits of successful companies on their business. The agent, therefore, without running any risk of invested capital, is really better paid than his company. Statistics of all the companies engaged in the business, through a long series of years, show that the profits of the business of insurance have been less than three per cent of the premiums collected.

INTEREST OF AGENT AND COMPANY IDENTICAL.

It must be evident that the interests of the agent and the company are identical. If the company is conservative and well

managed and the agent successful and energetic, the connection is likely to prove a permanent one. No company would wish to change an agent who steadily makes money for it, and the agency of a conservative company may, therefore, safely be regarded as a reliance for the lifetime of the agent and a legacy to his family. It not infrequently happens that the widow of an agent is able to conduct the business of the agency after the decease of her husband. It is, therefore, very important for an agent to assure himself before entering into so important a relation that the company he is to represent is worthy of his best efforts. Nothing can be more humiliating or embarrassing than for an active and intelligent man to discover, after months or years of honest labor, that the company with which he has identified himself, and in which he has persuaded his friends to insure, has been unsound from the start and is unreliable in the hour of need. The business of a lifetime may thus be lost by building on an unsafe beginning.

It is difficult to convince customers who, in the hour of disaster, discover that their policies are worthless, that the agent upon whom they relied for a proper understanding of his business and an accurate knowledge of the company he represents, has acted honorably and in good faith towards them; for, while the failure of numerous insurance companies during the last few years has led most men to examine for themselves into the standing of companies in which to insure, there are still many business men who rely implicitly upon the recommendations of the agent, especially if he is a personal friend, as to the reliability of his companies; and they do not fail to hold him strictly to account if they lose by reason of his neglect to inform himself as to the facts. Although an agent may represent twenty good companies, the failure of a single "wild cat," dishonest company might lose for him the confidence of the public.

It is a cruel wrong to a confiding patron to leave him in the hour of his misfortune with a worthless policy.

The Relation a Confidential One.—Though an agent may represent many different companies, his relation to each is that of a separate, individual trust. All of its books and letters of instructions *are strictly confidential and should be shown to no one without its consent.*

An Agency may be withdrawn at any time and the commission rescinded, if the company so elects. This provision will be found in the commission of appointment. On the other hand, the agent can, of course, resign the company whenever he chooses.

POWERS OF AN AGENT.

These are plainly defined in his commission of authority and in the printed and written instructions of the company. *He cannot delegate them*, and his policies and renewals signed by any-one else, even though by his direction, are absolutely void and of no effect.

He cannot exceed the powers expressly given to him, or bind his principal in any other direction than as expressly laid down in his instructions and commission; and to attempt to do so would only make him liable to a party suffering loss in consequence of an unwarranted assumption of authority.

The most serious and inexcusable mistakes are sometimes made by agents as to their powers, some even inferring that the mere promulgation by the company of a printed tariff of rates implies authority to write upon any risk mentioned in it. The only safe rule for an agent is to refer to his commission and policies and to assume that powers not expressly granted are, for some good reason, withheld. In case his commission is not sufficiently liberal to meet the necessities of his business, he should write to the company and explain the circumstances.

Under no circumstances should he issue a policy on property located outside his territory. It would be void.

SOLICITING.

The success of an agent depends largely, if not entirely, upon energetic and intelligent solicitation. Personal visits, oft repeated, to property-owners, displaying tact not less than talent, can alone be relied upon for securing patronage. The expedience of insurance and the merits of his company must be urged by personal application.

It is a mistake to suppose that advertisements in newspapers, printed circulars or conspicuous office signs are sufficent to secure patronage. And it is a false modesty which makes an agent hesitate to introduce either the subject of insurance or the merits

of his company to the attention of property-owners, whether acquaintances or not—unless his company is of questionable character and unworthy of his recommendation. He who considers himself above the earnest, sincere effort which his chosen business requires stultifies himself and deserves, and usually meets with, the contempt of sensible men. On the other hand, the agent who persistently and intelligently improves every fitting opportunity to bring the merits of his company to the notice of the public seldom fails to secure patronage and respect. Indeed, if we may judge from the success which the weakest and most unreliable companies sometimes meet with in localities where they are fortunate enough to secure energetic representatives, it would seem that it is not always necessary for an agent to have sound companies, if he be only *determined to succeed*, for it sometimes happens that such an agent will actually persuade an ignorant policy-holder to exchange the protection of a reliable company for a worthless policy in a company which he happens to represent. How much rather, then, should an agent succeed who represents a company of undoubted strength, of fire-tried reputation, managed by experienced officers and numbering among its directors the first merchants of the land!

"The great difference between men, between the feeble and the powerful, the great and the insignificant, is energy—invincible determination, a purpose once fixed, and then death or victory!" (Daniel Webster.)

A successful agent should not only know the merits of his own company and how to explain them, but he should observe the weak points of unprincipled adversaries. It is the duty of an honest man to expose fraud and deception wherever met with; but, on the other hand, he will not misuse the time in assailing an honorable competitor which *would be better employed in explaining the merits of his own company.*

COMPETITION IN FIRE INSURANCE.

To work effectually he must work intelligently. Some classes of customers require more explanation than others, and some men do not like to ask for explanations. All persons, for instance, do not so readily understand a proposal to insure their property "at 1¼%" as if stated "at \$12.50 per \$1,000." The

difference also, of $2.50, on every thousand, between 1% and 1¼%, seems less important to most men than does the difference in rate, especially where a stronger company is secured. The man who may not understand that he can insure his dwelling at 50 cents per $100 will immediately comprehend a proposition to insure it for $5.00 per $1,000.

The occasional indifference, however, of those who claim to be intelligent business men, as to the strength and standing of companies, in considering questions of rate is most surprising. If a merchant is offered two notes of different individuals—the one thriftless, irresponsible and unreliable, and the other possessed of an ample fortune, accumulated by well directed energy and economy, and with an established reputation for meeting his obligations—he is not long in deciding as to the relative value of the two promises, *especially if they have a year to run*; but the same merchant, in considering a proposal for insurance of ten times the amount of such a note, will sometimes accept the policy of a worthless company simply because he gets it a dollar or two cheaper than that of another possessed possibly of twenty times its assets, and with a reputation established by years of trial and fire. Can anything be more inconsistent than the conduct of a business man who is thus cautious and particular as to a note for a few hundred dollars, *but who carelessly places insurance policies for thousands of dollars in his safe without reading them and without satisfying himself as to the reliability of the companies?*

Many persons assume that because an insurance company is admitted to do business in a State by its insurance department, and has passed the scrutiny of the department, it must be, by reason of that fact, thoroughly reliable. But the property-owner should have explained to him that the State Insurance Department requires only the minimum amount of capital and surplus, and a company which might literally comply with the law might yet be weak and become insolvent by a single exceptional fire. As it costs no more to insure in a company with millions of surplus than in one having no surplus at all, the property-owner is foolish if he takes it for granted that all companies are equally reliable simply because they are permitted to do business under the insurance law of the State,

It is the duty of an agent to qualify himself, by close observation and study, to explain the strength of his company and to urge the desirability of reliable insurance upon property-owners; to convince them by persistent effort, clear and logical argument and apt illustrations, that so-called "cheap" insurance is not insurance; that a company can no more afford to sell its indemnity below cost than the merchant his goods, and that what rate would be below the cost of carrying his risk, as one of a large class, is almost as easy of ascertainment as the cost of any commodity on his shelves.

Competition, which is claimed by some to be the life of trade, is the death of insurance if it results in inadequate prices or rates. The proper conduct of the business in the interest of all concerned involves accurately ascertained and equitable rates; a cheap price for insurance generally implies reduced security, or the absence of that which it is intended to purchase, and inadequate rates must sooner or later surely result in worthless policies.

It should not require argument to demonstrate that, *since all the companies having policies on a burned property must incur the same percentage of loss and also the same percentage of expense, they should get the same rate, and the property-owner may well be suspicious of a company offering to write at a lower rate than the majority of companies are willing to accept.* The buyer of merchandise, who secures possession, when he acquires title, of an article of whose value he is a competent judge, may felicitate himself on a good bargain if he gets it below cost. With the merchandise in his possession and sure of its value, he has no reason to care whether the seller has lost money on it or not, but it is not so with insurance. Insurance is not a "good delivery" until the policy has expired or, in case of fire, until the loss has been collected; and he who secures it at a rate below cost and flatters himself that the other customers of the company do not secure the same terms, or overlooks the fact that, if they do, his insurance is likely to be worthless, would do well to keep his money in his pocket or deposit it in a savings bank.

Tact Versus Talent. A successful solicitor should be a tactful man. He needs not merely persistence, but judgment. He may accomplish much by "main strength and stupidity," but he

will need tact rather than talent, although the latter is, of course, admirable in its way. Tact has been described as being, "not a sixth sense, but the life of all the five. It is the open eye, the quick ear, the judging taste and the lively touch. It makes no false step; it loses no time; it takes all hints; it has no left-hand; no deaf ear; no blind side." After all, tact, carefully analyzed, will be found to be largely a proper, unselfish regard for a neighbor's feelings. It is safe to say that a good listener usually makes a more favorable impression than a fluent talker. Some one has truly said that tact consists rather in knowing what should not be said than in knowing what to say.

One of the most successful insurance brokers in the city of New York owed a handsome annual income to persistent and tactful soliciting. I was informed by one of his best customers that he was led to give him charge of his business simply because he became convinced that his interests would be well cared for by one who looked so well after his own. The frequent good-natured greeting "Can I do anything for you to-day in insurance?" instead of annoying the merchant, led him to believe, in time, that so persistent a man must be well worth patronizing.

An incident showing the value of tact and shrewdness came to the knowledge of the writer while traveling as special agent of the company with which he is still connected. An agent in the western part of Pennsylvania found great difficulty in inducing the property-owners of his neighborhood to insure, owing to the honest but mistaken views of a clergyman who enjoyed the confidence of his congregation to such an extent that he became their leader and adviser in temporal as well as spiritual affairs. He believed that it was wicked to insure either life or property, on the ground that it was tempting Providence. The agent in question soon reached the conclusion that to accomplish anything with the congregation it was necessary to capture the "bell wether" of the flock, and he said to him, one day:

"I am not so well acquainted with the Good Book as you are, but my understanding is that it enjoins upon men to bear one another's burdens; am I not correct?"

"You are," was the reply.

"Well, you believe that when a man's house or barn burns, it is the duty of his neighbors to assist him in his misfortune and to furnish the money for rebuilding?"

"Certainly," was the reply.

"Do you not think that all fellow-citizens in the United States, the man in Texas and the man in Maine, as well as our fellow-townsmen here, are neighbors to one who is unfortunate, no matter in what locality he may live, if the misfortune is brought to their attention?"

The reply was in the affirmative.

"Well," said the agent, "I represent a large insurance company which does business in every city, town and hamlet throughout the United States. In case a man's house or barn burns here in this town the hat is not passed around among a few of his immediate neighbors, who are little better off than himself and who can ill afford to give any considerable amount to his necessity; but the company, by its well regulated machinery, collects money from the entire country and distributes the burden among all of a man's neighbors everywhere, so that no one feels it unduly or beyond the amount of a small annual premium payment. Is not such co-operation a better way of bearing one another's burdens than the process which you advocate?"

He had for his opponent, fortunately, a man who, while bigoted and mistaken, was fair, and who frankly acknowledged that the matter had never been presented to him in such a light. The agent succeeded in securing insurance on his own dwelling house, and, soon after, insured almost every man in the neighborhood.

I was so impressed with the shrewdness and tact of the agent that I recommended him to the company for appointment, and he holds the agency to-day, after a faithful service of more than a quarter of a century.

His simple presentation of the theory of insurance is none the less an accurate analysis of the principle upon which all insurance policies are issued; for it explains not only its beneficent operation from the community viewpoint, but also the scientific principle of average upon which the calculations of underwriters are based for their profit. A company that confines its business to a small locality is not so reliable as one that draws upon a large territory for its income, and thus averages, not merely its premium receipts, but its losses, by distribution over an area which is not disturbed by the exceptional misfortunes of a single neighborhood.

It is advisable to secure the custom of enterprising builders and architects. In this way many desirable risks may be obtained by notice from them in advance, and the foolish indifference of some property-owners as to what company they insure with turned to advantage. The purchaser of a building is generally willing to accept, at least for the unexpired time, the insurance in force on it at the time of his purchase, and he can have less objection if the policies are those of reliable companies. For this reason the policy should be written, if possible, for a year, with the charge for the extra hazard of the builder's risk at short rates for the term added to the annual rate. Renewals of such policies should be written and delivered at least thirty days before expiration, or, in case renewals are not employed by the company, new policies should be placed in the hands of the property-owner. No policy should be allowed to run within 30 days of expiration without this precaution. Most persons have a natural reluctance to return a policy once accepted in order to take that of another agent, and not a few property-owners regard a policy once delivered as a consummation of a contract which they are in honor bound to carry out; so that more than nine points are gained if the agent succeeds in placing his policy in the possession of his customer thirty days before expiration. A good agent can in most cases retain business once secured.

A desirable feature of builders' risks is the opportunity they afford a careful agent to discover faults of construction, which are not apparent after the building is finished, and which may, if he is true to his calling, be corrected in time. This is especially true of smoke flues, which can only be examined while in process of construction. They should be surrounded, as is elsewhere explained, by at least eight inches of good brickwork, well laid in good mortar, and no woodwork should be framed into them. They would be still safer if lined with a good burnt clay or cast-iron pipe. Ordinary drain pipe or vitrified sewer pipe is a good lining. It not only improves the chimney as to safety from fire, but prevents accumulation of soot and insures a good draft. If the agent will acquaint himself with the features of a good flue elsewhere explained in this book he may render his client a lasting service. Nothing is more disagreeable than a smoking fireplace.

The agent should remember that when a risk is destroyed by fire, not only does his company lose the amount of the insurance, but he himself loses the commission which might have been secured each year during the life of a permanent structure.

The risks of a certain class of speculative builders, often men of poor judgment and unscrupulous character, who erect buildings in advance of any possible demand for them, with a view to selling them to parties unacquainted with their defective construction, should be avoided. Such buildings are in the nature of "experiments."

For full instructions as to the insurance of builder's risks and proper forms, see index.

A pocket expiration book (for which an ordinary cheap diary that will last for several years is well adapted) should be kept, in which to note the date of expiration of insurance which has been promised to the agent. Many persons who will not give a positive assurance as to their business *will not hesitate to inform an agent when their policies expire*, and if he keeps a record of them he may gather the fruit *when ripe* by calling say thirty-five days beforehand. It is generally useless to argue with a man whose policies have a year to run—unless his companies are utterly worthless and afford him no protection whatever—or to apply after renewals have been placed in his hands by an enterprising agent who has taken advantage of the natural and very proper reluctance of most men to return a contract once accepted and has delivered his at least a month beforehand.

"Nothing to Burn". Every insurance agent while soliciting has become familiar with the stereotyped argument of the average property-owner that there is nothing about his risk to burn, and that his rate, for that reason, should be lower. Probably no better illustration in refutation of this argument could be offered than the risk shown by the accompanying photograph of the metal-worker of the Brown Hoisting Machine Company, Cleveland, Ohio, burned December 17, 1900. I do not believe many underwriters contemplating this risk as it stood before the fire, would have supposed it possible for the entire structure to be destroyed, as it was, including iron-work. There seemed to be nothing combustible about the buildings, except an ordinary board roof, covered with slate, and a few wooden trusses and

wooden story posts, which one would suppose a single fire company could easily deal with. The floors were either of earth or heavy plank. The machinery manufactured, as well as that employed, was of the heaviest character. And yet the loss was nearly total to the insurance companies, one large company losing $37,000, where the reasonable expectation was that there could not be more than a $10,000 loss. I do not believe, moreover, that anyone looking at the office building would have supposed the fire would have spared this structure and destroyed the building on the right, marked "D," so remote from the starting point, which was, as shown on the diagram, at the extreme end of "A."

I think agents will find this fire a convenient argument with a certain class of property-owners in convincing them of the necessity of carrying 80% insurance, and of paying a proper rate; and in this view I have taken pains to insert the photographs.

The ordinary household furniture in one of the best fire-proof apartment houses in New York, constructed in the old-fashioned, solid manner, with brick floor arches and brick partitions, was destroyed as effectually as if it had been in a frame building—perhaps more effectually and thoroughly, because it is an observed feature of fires in fireproof buildings that there is little salvage on a single floor where the fire once gets under full headway. Ex-Chief Bonner and Chief Croker, his successor in the New York Fire Department, who have had more experience with fires in fireproof buildings, because of the greater number in that city, than the chiefs of other cities, tell me that it is almost impossible for firemen to work on the floor of a fireproof building when the contents, even as simple as office furniture, are once thoroughly on fire. The effect seems to be that of a reverberating furnace, fireproof materials confining the fire and increasing its intensity, on the principle of a brick oven. My own observation of such fires convinces me that it is not safe for underwriters to expect salvage on the contents of fireproof buildings under circumstances where a fire once gets under headway, a loss being more nearly total than in the case of ordinary structures, whose collapse, as already explained, tends to pile the merchandise in the bottom of the building in heaps whose interiors are not reached for want of air, on the principle that in

BROWN MACHINE WORKS, ERECTING SHOP AFTER FIRE.

THE BROWN HOISTING AND CONVEY

BURNED DECEMBER 17, 1900.

ACHINE WORKS, CLEVELAND, OHIO.

FIRE STARTED IN "A." ALL BURNED EXCEPT "C."

BROWN MACHINE WORKS, ERECTING SHOP.

the case of a pile of shavings fire seldom goes more than three or four inches into the pile, the inner shavings being white and untouched.

INSPECTION OF RISKS.

It is doubtful if any duty performed by an agent is more important for the purpose of preventing fire losses and insuring a profit to his company, than that of inspecting the risks which he insures. Inspection should be thorough, involving careful and intelligent examination of everything, from the top of the roof to the sub-cellar floor. Inasmuch, however, as the most important question to be considered before writing a policy is the character of the applicant, I shall deal first with what is known among underwriters as the moral hazard, or the danger of a fire from the carelessness or viciousness of the owner himself or of those having custody of the property. The best risk physically becomes a bad risk in the hands of an unscrupulous or careless man.

To detect danger growing out of the desire of a property-owner to realize upon his property by a sale to the insurance company, requires sometimes unusual shrewdness, not to say detective talent, and the exercise of a No. 1 quality of common sense. The percentage of incendiary fires for purposes of gain is smaller in cities with good fire departments than in localities where the chances are small of extinguishing a fire. The probabilities of extinction, in a city with an effective fire department, involve probabilities of discovery of contrived fires, and the incendiary is often deterred from starting a fire by these considerations, realizing that the chances of his being detected and punished are against him.

The percentage of incendiary fires as compared with the whole number, however, is generally grossly overestimated. The assertion is frequently heard that one-third of all fires are contrived. That this cannot be the fact is easily demonstrated. The percentage of fires exceeding 80% of the value, in cities with fire departments, is not over 6% of the whole number; and outside of fire departments, the percentage of this class of fires would not in most States, especially in the older, well settled States, exceed 25% of the whole number. On farms, the percentage

is about 22%. Making due allowance for the fact that a very large proportion of the fires in this percentage are due to frame construction, as well as to the absence of fire-extinguishing appliances, the number of incendiary or contrived fires must be greatly less than any estimate which has heretofore been placed upon them; for it requires no argument to believe that, as an incendiary has the choice of time and circumstance for starting his fire, the majority of contrived fires would pass the 80% of value line; indeed, it is safe to assume that 95% of contrived fires would be total. If one-third (the usual estimate) of all fires, therefore, were incendiary, and 95% of them were total, as they would be, there would have been no profit in the insurance business.

The writer became impressed with the unreliability of off-hand estimates, even when made by careful, practical men, by tabulating the causes of fires for a series of years based upon the opinion expressed by the adjuster, in each case, while on the ground. In this case the adjusters were requested to express their opinion as to the cause of a fire at the time of adjusting the loss, even though not sure of the matter, being advised that in a large number of fires, running into the thousands, errors would compensate each other; fires attributed to defective flues but due to incendiarism, for example, would balance those attributed to incendiarism but due to defective flues, &c.; so that for all practical purposes, the tabulation made, based upon the opinion of intelligent men on the ground, carefully investigating the best sources of information, would be thoroughly reliable.

This tabulation showed that in a purely farm business less than 3% in number, and less than 4% in amount, of all the fires were attributed to incendiarism internal—that is, by the owner—and that less than 5% in number, and less than 12% in amount, of all the fires for the period were due to what would be called "external" incendiarism, i. e., burning by enemies, tramps, &c. On other classes of risks, mercantile, manufacturing, &c., less than 2% in number and less than 4% in amount were due to incendiarism internal, and less than 5% in number and less than 9% in amount were due to incendiarism external.

At the end of the period, the adjusters upon whose careful investigations and reports this tabulation had been made were asked, one by one, to state their opinion offhand and from mem-

ory as to what percentage of all the losses adjusted by them to date were due to incendiarism internal and external. The percentages were much above the figures named. When informed as to the actual facts, however, they, of course, preferred that their careful statements, made in each case while on the ground and at the time of the fire should be taken, rather than any off-hand opinion as to the sum total at the end of the term.

These interesting figures clearly demonstrate, it seems to me, that the percentage of number of fires and of fire loss due to incendiarism is grossly overestimated. It would be well, however, to keep in mind an important fact, viz., that the experience is that of a large company employing competent inspectors, careful agents and careful office examiners, and paying liberally for special mercantile agency reports and putting all of its business through alphabetical lists of unreliable parties who have had previous suspicious fires. In other words, the business tabulated was what might be called a "culled" business, such as would be found on the books of the largest, most experienced and careful agency insurance companies.

A slight increase of the percentage of total losses, it should be borne in mind, would effectually interfere with the profit of an insurance company, however, and the agent who contributes by overinsurance, or in any way, to an incendiary fire not only prevents a profit to his company, but endangers the common safety and commits a crime against society.

It may safely be assumed that, while the percentage of incendiary losses on such a culled business, with a careful company, is small, THE PERCENTAGE OF INCENDIARY LOSSES ON RISKS WITH A MORAL HAZARD IS ALMOST CERTAIN TO BE ONE HUNDRED PER CENT and the agent is cautioned therefore to take no chances if he has any suspicions.

A compiled table of fires in the City of New York for a number of years indicated that 33% of the *amount* of loss was attributed to incendiarism. I have always doubted the figures, and my doubt is founded upon the fact already stated that, inasmuch as 90% at least of the incendiary fires must be total, the incendiary losses must be less as a percentage than the percentage of the total losses, thus corroborating the figures of the table I have constructed from actual reports made by adjusters at the time of the fire.

While overinsurance causes fires, it should be remembered that a proper amount of insurance may prevent them, by teaching malicious vagabonds that they cannot harm an enemy by burning his property, as the insurance company's interposition restores the loss. In this way the business of insurance, properly conducted, is a safeguard of society. It is undoubtedly a fact that more property would be burned, year by year, if the malicious and unscrupulous enemies of reputable citizens felt that they could bring them to want by applying a match. Even those who are simply envious and jealous of the prosperity of others could compass the ruin of the industrious and prosperous were it not for the protection which insurance extends over their property by day and night.

Constant supervision and watchfulness, with a keen judgment of men and values, are necessary to keep losses within the figures to which the more careful companies have hitherto succeeded in confining them. Not only must property be worth more than it is insured for, but *it must be a productive and paying investment to its owners.* Unless this is the case, its safety is not likely to be a subject of anxiety to them. It is not improbable that companies lose more money in consequence of the indifference of owners to the safety of property which brings them no income, and which is fully insured, than by the designing villainy of those who do not scruple to apply the match. Indeed, let this element of safety be once removed; this safeguard, which is so often the only barrier between the underwriter and loss; this protection, which is greater than iron doors or fire walls—*the anxiety of an owner for the safety of his property*—and the chances of escaping loss become so remote that it is best to cancel the policy at once.

It is for this reason that the sum of insurance losses follows the ups and downs of trade, like a barometer of misfortune. When certain classes of risks are making money for their owners—notwithstanding the fact that, at such times, there may be the extra hazard of overwork and forced production—the fewest fires occur; but let the times change and the manufacturer, who, while he had profitable contracts to fill, examined critically *for himself*, and with the proverbial thoroughness of the "master's eye," lest any untoward accident should interrupt his good for-

tune, becomes careless and indifferent to danger—*especially if fully insured.* In this way the moral hazard of *unproductive property*, even when it is insured below its value, may become greater than that of over-insured and productive and profitable property.

Value is not, therefore, the only thing to be taken into consideration, especially if it is estimated on the basis of cost, although more important, perhaps, than any other. It is unnecessary to suggest to any intelligent man that *cost* is not always a safe test of *value*, especially in the case of buildings, which through poor management, miscalculation, overcharges or exceptionally high prices of labor and material at the time of erection, can often be replaced for less than their original cost. Evidences of this occur in the experience of all insurance companies when adjusting their losses, *proposals being often received from the very builders by whom destroyed buildings were originally constructed to replace them for a much smaller sum than that originally charged.* Especially is this the case in dull seasons, when neither labor nor materials are high.

It often happens that a manufactory, erected, building by building, to meet the demand for new space, is not adapted to economical methods and is not calculated to compete with one more intelligently and systematically planned to save labor, &c. Instances have been brought to the attention of insurance companies where such buildings have been burned, in some cases by the owners, and in others by overzealous and mistakenly loyal employees, who have heard an employer remark that if the building should burn and he could get his insurance he would build a new factory which would be better suited to the work, &c.

Buildings, through mismanagement, are often found to be either too large or too small, or in other respects unsuited for the purpose for which they were originally designed and constructed, and if not available for this purpose are almost valueless for any other. An elevator building or a sugar refinery, for example, could not well be used for any other occupancy. It is clear that in such cases the cost of the building is no indication of its market value. A proper allowance should also be made for the probable deterioration of the property *during the term of the insurance*,

especially if the policy is issued for a longer term than a year. Some classes of property, manufacturing and mercantile risks, should not be insured for more than one year at a time, term policies being confined to dwellings, churches, etc.

Over-valuation is the rule, and not the exception. It is natural for an owner to overestimate his property. He seldom makes proper deductions for depreciation from age, wear, use, change of fashion or system. The underwriter, however, must be careful and discriminate intelligently between old, shelf-worn and unsalable stocks, and new, stylish and salable goods.

Owners of property who are desirous of selling are apt to seek an excessive amount of insurance, thinking that the sum that insurance companies are willing to carry upon a property may be regarded by a purchaser or mortgagee as an evidence of its value.

In view of these facts, it is difficult to lay down any safe or invariable rule for estimating values. In the case of buildings, the opinion of some reliable builder may be secured. In the case of stocks of merchandise, the opinions of others in the same line of business may often be obtained without difficulty, and such opinions are frequently quite accurate. In stocks where a single class of merchandise is kept, such, for example, as clothing, boots and shoes, &c., a rough estimate may be made by counting shelves and estimating the value of each; but this is unreliable. Every agent has trusted acquaintances in each line of business whose opinions may be obtained to assist his own.

Investigations as to the character of stocks of merchandise, however, are of little practical value in determining the moral hazard, except for the purpose of detecting evidence of over-insurance or contemplated fraud at the time of effecting the insurance. It is so easy to move merchandise by shipping it to distant points, or to reduce its value below the insurance, by failing to replenish stocks depleted by sales, that intended incendiarism can seldom be frustrated by either initial or subsequent inspections.

Books of account should be kept in fire-proof safes. Where a merchant does not keep satisfactory books of account in a safe depository at night, taking an inventory at least once a

year, and keeping copies of it, it is best to let him insure himself. Adjustments are difficult and always unsatisfactory in such cases. In insuring country stores in isolated locations, the "iron safe clause" should be inserted in every policy.

A further important reason for not writing insurance in excess of the actual cash market value is the difficulty of making satisfactory adjustments with the assured in case of loss. It is difficult to persuade a property-owner who has paid premium for a certain amount of insurance that he should accept less than the sum insured in case of total destruction, notwithstanding that the value of his property may be much less than the amount of his insurance. Certainly an agent who has persuaded him to take an excessive amount would find it an embarrassing task to adjust a loss at a smaller figure.

CO-INSURANCE.

It is important, however, in considering the question of moral hazard, and the objection to over-insurance, that underwriters should not lose sight of the importance of having a sufficient amount of insurance in proportion to value to prevent total losses under their policies in cases where the subject of insurance is only partially destroyed or, perhaps, slightly damaged. Indeed, this may be so important as to dwarf all considerations of moral hazard, which must be guarded against rather by shrewd observation as to the anxiety of the owner for the preservation of his property and a careful estimate of his character for honesty, than by attaching importance to a margin between value and insurance.

So lax have been the methods of the past in this respect, especially in towns with good fire departments, that we have been carrying too little, rather than too much, insurance, and have been estimating our rates upon bricks and mortar and incombustible iron beams, overlooking the fact that we have really, by reason of short insurance, been insuring plate glass, veneered woods and fresco work—as damageable as stocks of millinery. As already stated it is a comparatively easy task for the owner of a stock of merchandise, to ship to distant points, or to other buildings in the same town, a large proportion of the values which were in the store at the time of

writing the insurance; and our experience with fraudulent claims of this character leads us inevitably to the conclusion that, especially in the case of movable property, all reliance upon estimates of value, and attempts to restrict insurance to a safe figure, count for little as compared with intelligent estimates of the character of the assured. If he intends to defraud the company by removing the goods after inspection, or by failing to replenish a stock depleted by sales, no three-quarter loss clause will prevent his doing so.

In this view, I believe the value of the so-called "three quarter loss clause" is grossly over-estimated. Indeed, I doubt if it has ever prevented a fire.* It has secured many an apparent salvage, which, however, like gardening on paper, is only apparent. While the amount paid for a loss may be three-fourths of the amount of the *assured's claim*, three-fourths of his claim may be five-fourths, or even a larger fraction, of his inventory and amount to an over-insurance of 150% or more of true value. One has only to walk into any store or warehouse to see how impossible would be the task, even for an expert dealer in the same line of goods, to make a reliable estimate of the value of the stock from nailed-up boxes, covered bales, corked bottles, or tiered barrels. Two-thirds of the packages may be empty witnesses on dress parade. If it be impossible to prevent a designing rogue from deceiving us as to his values—and I claim that it is—why should we lose the premiums on 25% of the values of honest men, who outnumber the rascals a hundred to one?

We must, after all, rely for values, largely on the good faith, carefulness and intelligence of our agents and inspectors, and, in no small degree, upon the honesty of the assured himself, and his reputation for fair dealing. We will find that there is greater safety and more profit in insuring an honest and careful property-holder, for the full value of his property, than in insuring a dishonest and careless one to the limit of one-half his values; and the great problem of our business in the future, probably, will be twofold—to make sure of a premium for one hundred per cent of the value of the property insured, and to make sure

*These remarks do not apply to the clause on buildings, the value of which can be ascertained. It is important that the owner of a building should have a one-fourth interest in caring for it.

of one hundred per cent of honesty in its owner. This can only be secured by means of an intelligent representative of the company on the ground, viz., the local agent. He alone can determine the character of the man we insure, and keep watch of him throughout the term of the policy.

In the case of dangerous special hazards, for obvious reasons, requiring care and watchfulness on the part of their owners, it is best to see that the owner retains a sufficient interest above the amount of insurance to make him careful of the property. Where, notwithstanding a high rate, the owner of property seeks an excessive amount of insurance, it is wise to decline the risk. It is safe to assume that he has some unusual cause for anxiety.

I realize that the views I have here expressed on the subject of the three-quarter clause and the percentage of moral hazard losses, differ from my earlier writings but I have reached my present conclusions after careful study of the losses of my company through a long series of years and after careful tabulation of the actual figures from the reports of adjusters made on the ground at the time of investigating each fire.

The following propositions were submitted by me some years ago to a large number of underwriters, and an overwhelming majority of them assented to the deductions:

1st—It is practically not possible to determine the value of a stock of merchandise, for the purpose of insurance, at the time of writing a policy. Reliance must be placed upon the statement of the assured as to the quantity and value of goods in packages and on shelves. It would not be possible for another dealer in the same line of goods in any city to determine the value of stock. The owner could not do it himself without the assistance of his clerks and a careful inventory. It would not be possible for five experts in any line of goods—groceries, hardware, tobacco—to determine the value of the stock of any other merchant in their own line of trade. Therefore, it is not possible or practicable for an underwriter to do so.

2nd—As already stated, even if the value of a stock could be determined at the date of writing the policy, it would not remain unchanged, but might decrease by honest sales or dishonest removals, or by depreciation owing to change of style or fashion, shelf-wear or fly-specks. It is utterly impossible by any process to maintain the ratio of insurance to value at 100% or 80% or any other figure.

3rd—If it be impossible to determine the value of a stock when writing the policy, and impossible to regulate the value during the life of the policy, is it not impossible, by any limit of insurance to value, to place any restrictions upon a would-be incendiary? Is it not perfectly easy for a dishonest insured

to remove *bona fide* values after inspection, as a well known New York firm shipped theirs to a confederate in the West? Is it not perfectly easy for a rogue to claim a value of one hundred thousand dollars on goods worth only twenty thousand dollars by a "dress parade" of empty packages for inspection, insure them for $80,000, with an 80% co insurance clause, contrive a fire and collect 400% of value by means of false inventory and books of account, or by books and inventories destroyed in the fire? In fact, a fire-bug likes nothing better than a three-quarters clause or 80% co-insurance limit clause. In order to have appearances in his favor, he would take a term policy, if we would let him, especially as the premium would come out of our pockets.

4th—If we must rely upon the honesty of the assured as to quantities and values when we insure and when we adjust and pay him (and we must, because we cannot disprove them), why should we not rely upon his honesty for not burning his property? The temptation of an excess of insurance to value is no greater by reason of his having it, for it is easy for him to secure it at any time he wants it.

5th—Was there ever a case of fraudulent burning in which, with all our precautions and rules, three-quarter clauses, etc., etc., the claimant was not overinsured in fact although not apparently so? If we have never succeeded in catching a rogue by a 75% limit of insurance to value, why should we keep on setting the old trap, with the expensive bait of one-fourth of our income, losing the premium or contribution of 25% of the values of honest men, or one full year's premium out of every four!

6th—Why should an honest man with a small capital, who buys upon credit, be unable to protect his fraction of the stock, and have all of his insurance go to his creditors who must, of course, be paid even though he should become a bankrupt? Take, for example, a man with a capital of $25,000, and a stock of $100,000, which he is enabled to handle by reason of ability to purchase on long credit; the 25% which we do not allow him to insure is his own and he would lose it altogether by fire. Why should he not be able to protect it if he pays for it? It is for the interest of the public, and even of the underwriter, that such a man should not become a bankrupt.

7th—Is it not perfectly easy to grade our rates so as to make as much money with 50% of value insured as with 80% or 100%, and if so, is it not wise to do so, in view of the opposition of legislators and the antagonism of property-owners? Our insistence upon 80% of insurance—neither more nor less—is as unreasonable as it would be for a merchant to decline to sell a man less than a hundred cases of goods who has facilities for disposing of only one, but who is willing to pay a retail price instead of a wholesale price. How much better to be able to say to the objecting applicant at our counter: "We do not care how much you insure; you can take as much or as little as you please; our prices, of course, vary between wholesale and retail, just as your own do." Opposition would be disarmed and hostile legislation avoided. If it is easy to do this (and it is), then is not the easy way, if it be just as good, the best way?

If we could ascertain and fix the value of property and maintain the ratio of 100 to 80 or 100 to 75 of value to insurance, during the life of our contract, there might be some advantage in an 80% or 75% limit of insurance; but

we cannot do it, and we may as well give up trying and secure the premiums or contribution on the 20% of the values of honest men.

I trust that nothing I have written on the subject of the desirability of co-insurance and on the difficulty of estimating the value of stocks, however, will lead any agent to suppose that I underestimate the importance of careful scrutiny of every risk offered, to detect improper motives; the main object—never to be lost sight of—is to avoid dishonest applicants for insurance, and particularly to avoid those careless property-owners who neglect the simple, obvious precautions of safety, and permit accumulations of rubbish which may ignite spontaneously, and who, overlooking precautions which would prevent the starting of fires, and failing to provide appliances for extinguishing them, prove undesirable subjects of insurance.

Do not insure litigious or quarrelsome men. They usually have enemies, and often unscrupulous ones. Inquire carefully whether any threats have been made to burn the property; whether any fires from *unknown causes* have occurred either to the property on which insurance is sought or any other belonging to the applicant. Unless the applicant is a well-known citizen, his antecedents should be rigidly inquired into. In this matter the company is always willing to be of assistance, as it needs only to write to its agent in the town from which the newcomer has emigrated to find out all about him. Do not fail, therefore, to inform the company as to the applicant's statement of his antecedents.

A dangerous class of men is traveling from one point to another, burning out in one place after another; and while the company's records at the home office might give it the information a fire sometimes occurs between the writing of the policy and the request for cancellation from the office of the company on the receipt of the daily report. Therefore, where there is the least doubt as to the character of a party, do not insure until the company is advised—by telegraph if necessary.

Decline to insure "exceptional property" for parties, as where they insure only on certain buildings, carrying others themselves. There is generally a reason for it, which we ought to know. Some men insure their barns only, carrying the dwellings themselves. Railroad companies are apt to insure only

such bridges, depots or other structures as they consider dangerous.

Inquire whether applicants have been trying to sell out, and why. Have they been in the habit of regularly insuring against loss by fire, or have they become suddenly impressed with the value of insurance? Such changes of opinion will always bear investigation, which may disclose threats of enemies to burn the property. Avoid heavily mortgaged property, especially if mortgages are falling due; and decline to insure property the title to which is a matter either of dispute or litigation, buildings or merchandise in the hands of sheriffs, U. S. Marshals, &c., &c. The chief objection in the latter case is to the difficulty of adjusting the loss and of determining who is the proper party to receive the money.

Leases should not be insured unless the applicant has a good bargain. He may have taken the property during prosperous times, when rentals were high, and be losing money in consequence of a change of trade, &c.

Avoid "**experiments**"—undertakings the result of which is, at best, problematical—"new departures," &c. The insurance company too often furnishes the money *in case the enterprise fails.*

A large and expensive grain elevator may be located where it cannot possibly receive grain enough to fill it, and disappoint its owners; or it may, by a change of railroad or canal facilities, be left stranded without possibility of patronage. A large manufactory, fitted out with costly machinery, may be erected to manufacture some article which does not meet with a ready and steady sale, and prove ill adapted for manufacturing any other. An expensive stock of silks and laces is taken to some country town, whose people are possessed of more intelligence than money, and finds no purchasers. Every undertaking of some men is an experiment, on account of the entire absence of judgment displayed. If stocks of merchandise are purchased they are not suited to the trade, or are too large for the demand; if a manufactory is erected, it is too large or too small for the purpose, or impractical for some other reason which might have been foreseen. The result is, and must inevitably be, failure. An insurance company will do well to avoid such risks, relying

upon the exercise of wise caution and discrimination on the part of its agents, who should always remember that *upon the probabilities of success of undertakings depend, in very many cases, the probabilities of profit for the underwriter.*

If initial inspection and careful supervision do not result in as great a saving to the insurance companies as their estimates of moral hazard losses have led them to expect, claims of this character will be restricted to a point where a loss will be the result only of neglect on the part of the local agent to carefully and shrewdly investigate each claimant for insurance and to keep track of him throughout the life of the policy.

The old saying "another good man gone wrong" it is rightfully claimed should generally read "another bad man found out." Lapses from honesty on the part of men of good standing, where they deserve their reputation, may be rare; but departure from correct living may be expected at any time of a man who has more reputation than character and who joins a church to be popular or to inspire confidence. Therefore, the agent should be constantly on the alert. The gossip around the cracker barrel of the corner grocery may be worth listening to. But equally, if not more, important, is the necessity of inspecting carefully with a view to preventing fires from carelessness and from indifference to safety. The neglected ash or rubbish heap has cost insurance companies more money than the tramp or the incendiary. Rubbish in cellars is particularly objectionable, but ash heaps may be found even on the upper floors of buildings in the best localities.

Thirty years ago, while inspecting buildings in the city of Philadelphia, I found 800 cases of ashes kept in wooden boxes, barrels and other combustible receptacles; and on the top floor of one of the most pretentious buildings, on the most fashionable street (Chestnut Street), I found, after insisting on the janitor unlocking the door of a small room, that it was used as a general ash dump of the entire building. At the time of my visit there must have been not less than five cart-loads of ashes on the floor, it having been the practice of the employees of tenants throughout the building to dump their ashes on the floor in the same manner as they would have done if the ash heap had been in the back yard.

In a machine-shop, I found, wedged tightly between the floor and the lower head of a heating drum, a bunch of oily waste. It required an effort to pull it out, and the lower head of the drum was so near the floor that I literally had to "stoop to conquer," for it was not observable to one walking through the room. I had observed on the floor below that a large cylinder stove was red hot, and I resolved naturally to follow the pipe on the upper floor where the drum was located. The bunch of oily waste when detached was brown on the surface next the drum. As it was four o'clock in the afternoon, the foreman readily assented to my proposition that it would have caused a fire, probably, within a few hours after closing.

In this connection let me say that all heating drums of this character should be raised to a sufficient elevation above floors to bring into full sight any rubbish collected beneath them.

When, in the boiler room of this same factory, I found nearly half a cord of old lumber piled on the top of the boilers to dry, I concluded that my company would be safer without the risk.

Careful analysis of the causes of fires, made from the reports of adjusters at the time of adjusting the losses, shows that 60% of them are due to preventable causes. Assuming that one-half of these might be prevented would imply that forty millions of dollars each year are unnecessarily lost by property destroyed throughout the country. This estimate of salvage is below the true figure in all probability.

Where sawdust is used upon floors, especially in risks using or selling oil, such as drug stores, paint stores, grocery stores, &c., the sweepings are particularly dangerous if piled up where the heat can accumulate, as when deposited in barrels. Such sweepings should be immediately removed from the building and located where ignition could not endanger it. In the case of a large wholesale drug store, I was informed that these sweepings caught fire almost daily, and the owners had been admonished by their own experience as to the importance of the precaution I have suggested.

Be careful as to insuring "**Branch stores.**" They nearly always have shelf-worn, unsalable stocks, and owners have been known to transfer large amounts of merchandise from one store to another without keeping proper book entries.

Country stores not occupied in part as family dwellings, or which are not near dwellings, at cross-roads or isolated locations, having small custom and a poor trade, have always been losing risks to insurance companies—possibly because their situation and vacancy at night admit of fraud on the part of the owners by removal of the goods before a fire; or of robbery by others and subsequent burning to cover traces of the crime.

Do not insure "**nuisances**"—those risks which, by reason of some disagreeable feature, become obnoxious to persons living near them, the value of whose property is affected by them; such as slaughter-houses, bone-boiling establishments, soap factories, garbage crematories, some classes of chemical works emitting disagreeable odors, etc. They are very liable to be set on fire, even if located in the country, especially if on the road to a town. Even when surrounded by farms they are apt to be burned by owners of adjacent property, as their presence would deter anyone from purchasing land for the erection of dwellings, &c.

Decline **barns** or **stables** situated in the outskirts of towns, especially if unpainted, dilapidated or unconnected with dwellings. The very appearance of unpainted, neglected buildings suggests and invites incendiarism on the part of malicious boys and unprincipled firemen, to have a "run" with the engine. It may generally be assumed that frame buildings unpainted and weather-beaten in appearance are undesirable risks. They indicate, if nothing else, an absence of care on the part of the owner. A neat, well painted building, kept in repair by a thrifty owner, is a much safer risk than an old, dilapidated one, although the occupation and exposures may be the same. Barns standing in the outskirts of towns and unconnected with dwellings are very different risks from the neat, well painted structure of a thrifty owner, on the same lot with his dwelling, and are very much poorer risks, also, than *farm* barns, which, though sometimes unpainted, may be safe risks *if near to and insured with the dwelling of the owner.*

When reporting a barn risk to the company, be careful to explain the circumstances fully in the daily report, as to whether the company insures or will insure the dwelling, &c., &c. It will save subsequent correspondence.

Old, dilapidated manufactories, or other structures, in the compact parts of towns, which stand in the way of improvement, and have become "eye-sores," if not actually set on fire to get them out of the way, become dangerous for the further reason that in case of accidental ignition *no one feels interested in their preservation*, and neither firemen nor citizens will exert themselves to save them.

At a recent convention of the Chief Engineers of Fire Departments the chief of a Western city actually argued that the burning of such structures was a good thing for the town in which they were located, inasmuch as they would be removed as nuisances and the cost of the destruction would fall upon the insurance companies. This remarkable utterance can be found in the printed report of the proceedings of the convention. He was honest enough in his statement, because he believed it; but if firemen take this view of such structures, it behooves underwriters to leave the cost of replacing them to the enterprising citizens who desire better buildings.

The following utterances may be found in the report of the Twenty-fifth Annual Convention of Fire Engineers, and were applauded:

"We do not want these things to last forever. Chicago, the second city, if not the first in many respects, upon the earth, is made so on account of being destroyed by a fire. There is no question about it, and no man lost a dollar (tremendous applause), not a dollar!"

An editorial of the New York Times of May 8, 1901, commenting on the destruction of Jacksonville, Florida, contained the following:

"Any American town that has 'tumbled up' to be a winter resort, or a summer resort is always in need of reconstruction, to fit it for its new function; it ought to be at a certain period burned out; then it can be reconstructed in the light of experience on a better system and at the expense of the stockholders of the insurance companies."(!)

To correct such views may not be possible, but loyal insurance agents should see to it that their companies are not saddled with the expense of replacing objectionable structures with buildings more acceptable to civic pride. When a building becomes objectionable it should be torn down, and not burned up; and if uninsured, it will be torn down.

Surely, a campaign of education is needed to teach a certain

portion of the public the important fact that when buildings are removed by fire the public pay for them, and it will be less expensive for that public to tear them down than to burn up a dozen good buildings, or a whole city, by the burning of a single structure, as in the case of Jacksonville.

The insurance loss in this case, while over $5,000,000, was only about one-third of the property loss. It would be difficult to reconcile those citizens of Jacksonville who were uninsured, or only partially insured, to the theory of the New York Times that the destruction of their town, which had "tumbled up" as a winter resort, was a desirable thing from their own or any other viewpoint.

Avoid buildings which are shortly to be removed or pulled down, or those standing on leased ground, the lease of which is about to expire. If the terms of the lease are such that the building is to revert to the owner of the ground at the expiration of the lease, such buildings are, of course, worth no more to the lessee than for *the use of them for the time the lease has to run*—say what would remain after deducting from a fair rental taxes, cost of repairs, &c., &c.

Vacant buildings, unoccupied dwellings, &c. Unoccupied buildings and notably vacant dwellings have been unprofitable risks to insurance companies. They become the sleeping places of tramps and vagrants, who are careless and indifferent as to fires, sometimes maliciously setting them purposely on fire. A moral hazard attaches to all unproductive property. In the case of dwellings, 10 cents a month per $100 should be the minimum charge for vacancy, and some careful person should have charge of the building. The fact that it is looked after, every day is of importance. If located at a distance from other buildings, in isolated localities, all companies prefer to decline them. Be very sure that the vacancy is not a chronic case and where there is any doubt give the company the benefit of it and decline to insure.

Where dwellings are unoccupied on account of unhealthy locations, in malaria or fever and ague districts, they should be regarded as uninsurable. A good dwelling in a fever and ague district may be a worse risk than a steam planing mill.

With few exceptions, special hazards or manufactories should pay the same rates vacant as when running, for they are poor

risks unless productive *and must not be insured without the consent of the company first obtained.*

Unless permission for vacancy is endorsed in writing on an insurance policy, it is void. In all cases the time of vacancy must be limited.

Too much caution cannot be used in accepting risks declined by other companies. Always refer such cases to the company. There will usually be found some good reason for such declination, in ignorance of which it is not safe to insure. It should be remembered that companies declining risks because of moral hazard are not disposed to give all their reasons for such action and it is, therefore, not easy to ascertain the facts.

Large and expensive dwellings exceeding in value the average structures of the neighborhood, erected by individuals of exceptional wealth or folly, may be actually unsalable in case of the death or failure of the owner, and a moral hazard may grow out of the inability of the heirs of an estate to realize their share of such structures, in which case the temptation to sell them to the insurance companies is great. Where a dwelling exceeds in value, by more than 50%, the average of those in its vicinity it would be difficult to find a purchaser in case the owner should wish to sell, or in case he should die and his estate should have to be divided.

Large so called "palatial residences" sometimes approach the physical hazard of summer hotels, and fires have been discovered burning briskly in one portion of the building while the inmates in another portion were entirely ignorant of the fact. Losses are generally total.* In "boom" towns expensive dwellings are often erected for speculative purposes, to add to the value of surrounding property for sale, and are poor risks. Refer all dwellings in cities, exceeding $50,000 in value, to the company, and, also, country or suburban dwellings exceeding $20,000 in value, before binding a line on them.

Season dwellings—Summer or Winter. A moral hazard is frequently involved in these, especially on a yielding sea-shore, where the cost of bulkheads for protection from storms is some-

*A five year fire record of the class within a radius of 25 miles of the City of New York, made by me, showed losses of $1,000,000, or $200,000, per annum This would have required a yearly premium of $360,000 for a 55% loss ratio. The class did not yield one-half that sum at the prevailing rates, which proved inadequate.

times an onerous burden. Mutual exposure, also, is an important factor, where they are near together.

Camp-Meeting ground dwellings. These have not been profitable. They should be referred to the company before the insurance is made binding. They should pay at least two per cent. annually. Their mutual exposure is serious, owing to proximity, and the question of line is an important matter, as well as the question of rate. For the reason that they are seldom looked after with sufficient care to prevent their ignition from forest and grass fires in the vicinity, and that they offer opportunities for wholesale destruction by mischievous or malicious incendiaries, experience shows that they generally all burn together.

The question of line on unoccupied risks of this character, mutually exposing each other, should be carefully considered. Underwriters are apt to regard the question of line as dependent entirely for its solution on the distance between various risks insured. Where these risks are vacant, however, they may practically become one hazard if a designing incendiary should determine to set fire to all of them, no matter how far separated. Therefore, the incendiary hazard should never be lost sight of in considering mutual exposures, especially of vacant property.

PHYSICAL HAZARD.

Having dwelt at such length upon the moral hazard, we will now proceed to consider the physical hazard and those dangers which are to be found in all risks, even where the owner is honest and careful, and first as to

Exposures. All buildings exposing the risk should be carefully inspected, remembering that where an uninsurable hazard exposes a risk so that the chances are in favor of both burning together it is wise to decline both. A building not exposed by any other within 100 feet, with a good fire department, or not within 120 feet where there is no fire department, is usually regarded as "detached," and agents are expected to show all risks within that distance on their diagrams; much greater distances, however, have been found insufficient to ensure safety in dry seasons and with high winds. It will often be found, moreover, that an objectionable special hazard or manufacturing risk, though not within hundreds of feet of a risk, still exposes it by reason of intervening buildings, lumber piles, etc. Where this is the case the diagram should correctly show the intervening buildings and the lumber piles, with their size and height; and an honest agent will not content himself with merely answering the questions in surveys and daily reports as to risks within 100 feet. The experience of companies shows that too much attention cannot be paid to outlying exposures, and to the direction and force of the prevailing winds of a locality. Lumber yards are bad exposures, for, in a high wind, burning boards and shingles are often carried to great distances.

The inexcusable shortsightedness of some municipal authorities as to the danger of outlying exposures costs the country, every year, millions of dollars. It was a lamentable reflection upon the intelligence of a great city that a vicious cow, in a frame shanty, with a single kick, could inflict a loss of over one hundred millions of dollars upon the citizens of Chicago, and.

through the distributing medium of insurance, upon the whole country.

As I write, news comes of the destruction of Jacksonville, Florida, (May 3, 1901) and a loss of fifteen millions of dollars, in substantial warehouses, costly dwellings, handsome churches and other property, due to a fire starting in a factory for drying the Southern vegetable moss for upholstering cheap furniture. Fire had started repeatedly in this structure, and the employees were in the habit of extinguishing it day by day. At last, it got beyond control, catching from a single spark at noonday. The result was the destruction of a city. But how lamentable that this peril had existed so long and had been ignored by municipal authorities, citizens and underwriters!

Similar situations of cheap, dangerous outlying exposures can be found in scores of cities, but will probably not be discovered until life and property have been sacrificed. Are not the underwriters of a city under obligation to their fellow-citizens of other callings to study the fire hazards of their city, so as to point out its dangers, in compliance with that law of community which makes it the duty of each individual to give his fellows of other callings the benefit of what he has learned in the pursuit of his particular business?

Buildings with shingle roofs, barns and stacks of hay and straw near railroads are poor risks, owing to the danger from flying sparks, either from locomotives or from steam vessels on water fronts.

Forests and prairies are sometimes serious exposures to buildings near them, on account of sweeping fires to which they are liable. Barns and hay stacks exposed to prairie fires are not profitable risks, and few companies will accept insurance on prairie hay in stacks, unless removed to the barn-yard. It is seldom of much value, and when stacked where cut is liable to prairie fires.

Frame rows and ranges. These are subject to the dangers of the worst building in the row, whether the hazard be moral or physical, and the agent should not content himself with examining the particular building in which he proposes to take insurance. Buildings, of course, are less desirable than grade floor stocks, which can be saved by removal, although a rate

measuring the difference between the building and the stock could easily be computed. It should be remembered, too, that although a grade stock may be removed, it is often, where the rate is high, insured for so small a percentage of value that, unless there is an 80% co-insurance clause in the policy, whatever salvage is secured by carrying out goods will be found to belong to the owner and not to the insurance company.

Buildings in frame rows are liable to deteriorate rapidly and to become, in time, occupied by second and third rate tenants, for which reason, also, buildings are always worth more than the stocks.

The stocks in end buildings of frame rows are the most desirable, for obvious reasons.

Brick buildings in frame rows, unless almost fireproof, with blank fire walls at least 18 inches thick extending beyond the rear and front of the frames, with metal cornice and roof, and no woodwork exposed, are unprofitable risks at the rates usually obtained for them. They are more than likely to burn with the frames, especially if the latter are over one-story high, and should not be insured at a much lower rate, whereas the most inexcusable and ridiculous discrimination in favor of such buildings is usually made. In fact, a brick building, with a shingle roof, wood cornice, or windows in side walls unprotected by fire shutters, is little, if any, better than the frames on either side, and, at the usual difference in rate, an intelligent insurance company would prefer a smaller amount in the frames, the moral hazard being the same.

Omnibus blocks, subdivided only by lath and plaster stud partitions, with numerous tenants, seldom pay adequate rates, and should be regarded as one risk, liable to be totally destroyed if a fire should start in any section. The line for the whole block should not exceed one-half that of a first-class single occupancy building, because the chances of fire starting are greater and the probabilities of extinguishment less. Indeed, few classes of risks are more undesirable at current and obtainable rates. They are very apt to have one or more vacant rooms or stores, which are sometimes hired for short periods by objectionable tenants, such as itinerant vendors of patent rights for explosive kerosene oils, gasolene gas machines, vapor lamps, &c., &c.,

which are on exhibition by day and night. The upper floors will be found to have tenants careless as to ashes. Kerosene lamps on brackets in hallways are apt to be neglected; and a proper charge for the number of tenants alone, if all were safe and desirable parties, would result in a rate double that usually obtained.

The mutual exposure of brick or stone buildings situated in contact but at right angles to each other, even though separated by a fire wall extending through the roof, is sometimes very serious by reason of the windows in the angle or corner, and is much greater than where buildings are constructed in a continuous straight line. Such mutually exposed windows should be protected with fire shutters. In many cases a group of buildings so constructed, as in the case of mills or other manufactories, built in the form of a hollow square, though otherwise divided and *intended to be separate risks*, become virtually one hazard, and lines and rates should be regulated accordingly.

Narrow streets and streams of water are often erroneously regarded by inexperienced agents as cutting off all danger from exposures beyond them.

Petroleum yards, refineries, warehouses and petroleum piers, from which petroleum is loaded on vessels or cars, are very dangerous exposures, and no ordinary exposure distance is the measure of safety. A fire occurred at the harbor of New York, caused by a careless sailor striking a match in the cabin of a schooner, laden with oil, in which, contrary to regulation, the cabin and forecastle were below deck. The cabin was filled with vapor from the oil, and the ensuing fire destroyed the warehouse, four or five vessels, and many thousand barrels of oil; *and the burning oil, floating on the water, set fire from below to a pier which was filled with tobacco, cotton and other valuable merchandise, more than 400 feet distant from the one first burned.*

Wooden cornices. Hollow, wooden cornices sometimes serve to connect an entire block of brick or stone buildings which would otherwise be separate risks, so as to make them virtually one hazard. In case of fire in one of such a row of buildings, they conceal the creeping of flame to the roof timbers of those adjoining. In this way the entire structure of a roof may be-

come hopelessly on fire before the fact can be discovered by firemen in the street below, the flame being out of sight and out of reach of water from the engines.

It may be questioned if massive, hollow, wooden cornices are not more objectionable than shingle roofs, since the latter do not conceal the fire which ignites them externally. Indeed, a brick block may become as dangerous as a frame row by reason of wooden cornices. Such faulty architecture is to be deprecated. It certainly is not ornamental, and violates the rules of good taste not less than those of safety. It is a peculiarity of American architecture to be corrected only by the united efforts of underwriters, builders and architects. Where new buildings are being erected in a town, the local board of underwriters should protest against such serious faults of construction, and the system of rating should fix a penal charge large enough to be deterrent. It frequently happens that an owner is ignorant of the objection to them, and when informed that he will have to pay a penalty in higher rates, each year for the entire life of the structure, he will dispense with them. They should never be lost sight of in estimating the hazard of an exposure or in considering the important question of line.

Empty boxes, barrels, old lumber and rubbish in the rear yards of buildings. The accumulation of piles of empty boxes, rubbish, hay, straw, and other packing material, in the rear yards of buildings, often in contact with the buildings themselves, tends to the spread of conflagrations in cities and towns. Such collections offer ready fuel to falling sparks and burning shingles, and buildings of substantial construction, with metal roofs, which might reasonably be considered fireproof externally, succumb to these "attacks in the rear."

At a large fire in Springfield, Mass., in May, 1875, Hurlbert's granite-fronted building, and other first-class brick buildings blocks away from the scene of the fire, were ignited and destroyed in this manner. A sweeping fire in the city of Fargo, Dakota, was due to this fault, and cost the Continental Insurance Company nearly forty thousand dollars, other companies suffering in proportion.

If fires from these causes had been eliminated from the profit and loss account of insurance companies there is little doubt

that they would have made a profit on their business as a result of the correction of this fault alone. Legislation, municipal and State, should be directed to the evil; and any system of rating which does not impose a penal charge for it is grossly defective. The "Universal Schedule" makes a charge for this fault under its "Faults of Management," as well as for the accumulation of rubbish in cellars and other portions of the building.

Receptacles for waste, rubbish, etc. These should always be of metal—never of wood and they should be emptied every night and never left in the building. An old-fashioned cast-iron kettle, with legs and a metal cover, is a safe receptacle for oily waste or rubbish, which is liable to ignite spontaneously. All rubbish should be treated as dangerous.

Large accumulations of empty kerosene and naphtha barrels, especially, are serious exposures, but are frequently overlooked as such by underwriters in inspecting risks.

The system of charging for exposures in the Universal Mercantile Schedule will be found to take into account all of those considerations which any intelligent underwriter would weigh carefully in making his rate. Agents sometimes overlook the danger to stone fronts of buildings, especially of cut stone or ornamental carving, which may be severely, if not irreparably, damaged by the heat of a fire on the opposite side of the street.

The damage of $70,000 to the ornamental marble front of the Home Life "fireproof" building by the fire of December 4, 1898, in New York, is a forceful illustration of this feature.

Livery stables are frequently serious exposures to mercantile buildings in towns, especially if over one-story high, and if hay or straw in any large quantity is kept. *They will not infrequently be found extending behind and exposing the rear of an entire brick block.*

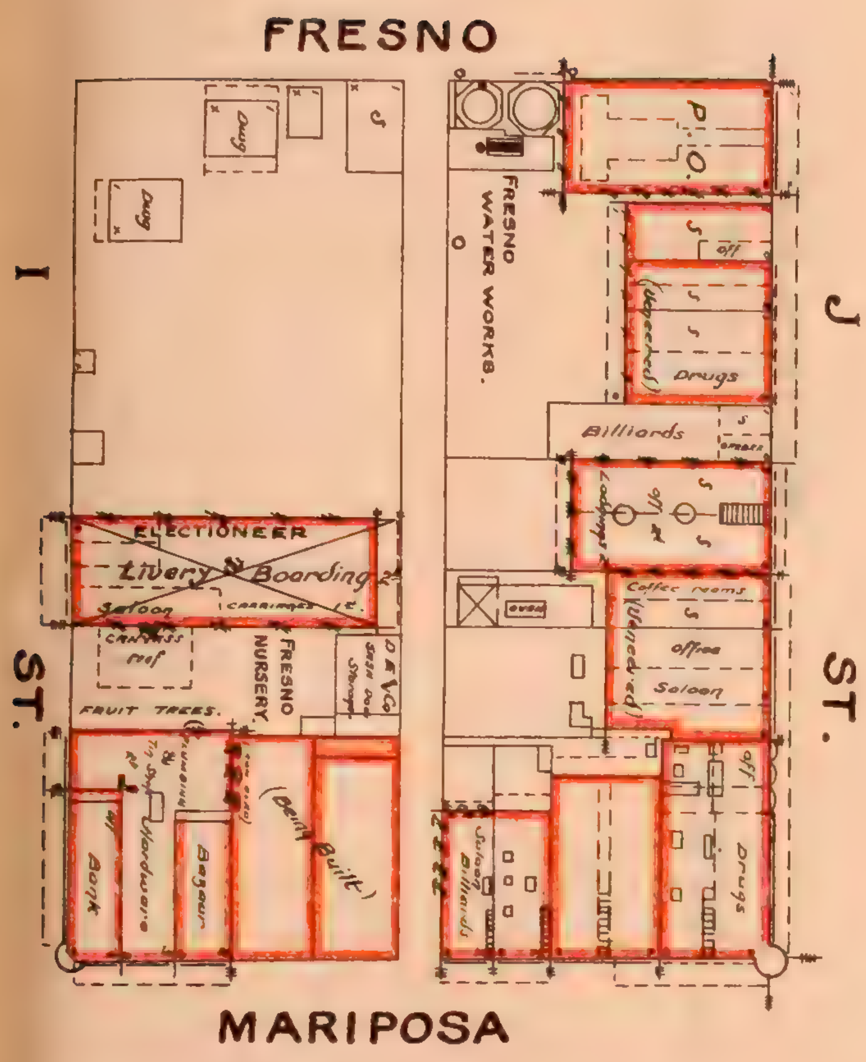
Buildings containing stocks of agricultural implements, wooden-ware, lumber, veneers, high-wines, oils, and other combustible and ignitible materials, offering substantial fuel to flame should be regarded as more serious exposures than those containing less inflammable merchandise. Of the special hazards or manufacturing risks, woodworkers are of course, serious exposures, not only because of the frequency of their burning, but on account of the intensity of their fires.

The exposure caused by a frame building to one of brick or stone adjoining it is more serious if the frame extends *beyond the line of its rear wall.* It is difficult for firemen under such circumstances to prevent a fire in the frame from working its way through the rear windows of the brick building, unless such windows are protected by fire shutters. No woodwork should be exposed on the rear walls of brick buildings in such cases.

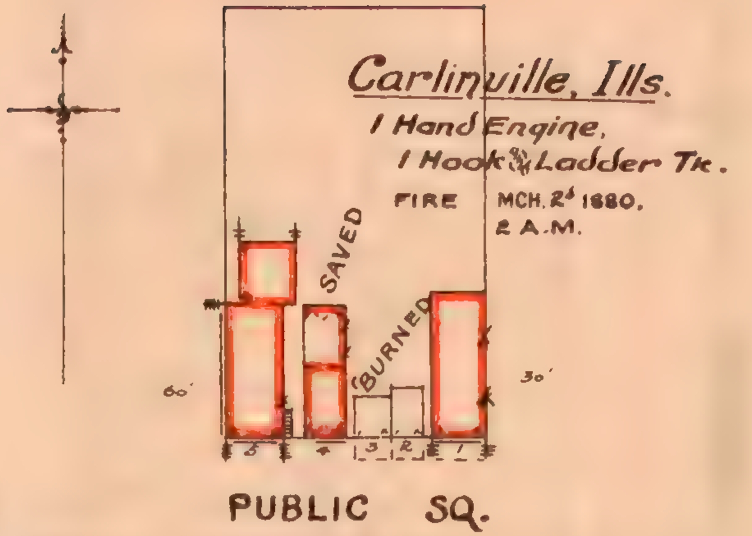
Wholesale drug stores are very objectionable exposures, owing not only to their liability to take fire but also to the explosive character of many of the substances kept. It is questionable as to what thickness of wall is sufficient to confine a fire in such a stock.

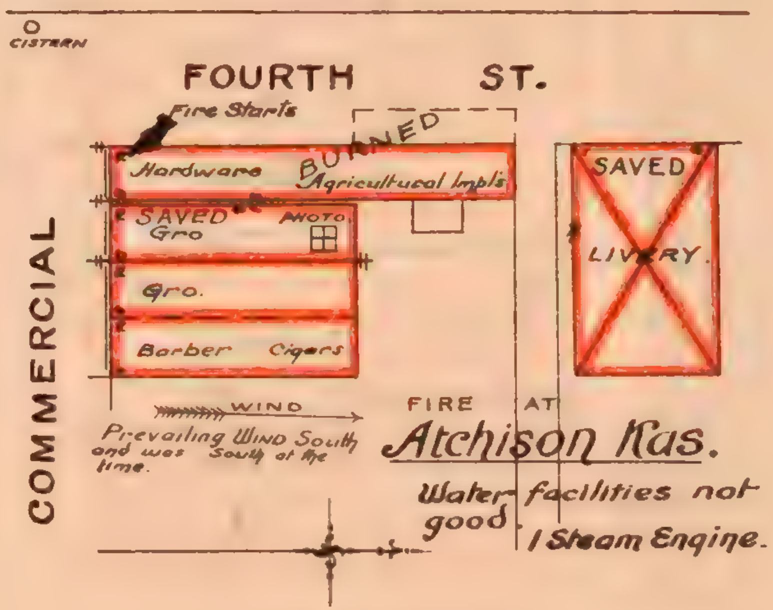
It is, probably, unnecessary to mention other objectionable risks, as the agent will find them treated of specifically elsewhere, my purpose in this connection being to call attention only to those most commonly overlooked.

The problem of estimating the danger of fire from the exposure of other buildings in the vicinity is one requiring careful thought and study and knowledge of the experience of companies. The freaks of wind currents, while quite often operating to save structures of the flimsiest character when more substantial buildings are totally destroyed, as in the case of the great Chicago, Boston and Troy fires, result sometimes in the burning of buildings owing to fires in small structures whose proximity is not regarded as a menace. The following diagrams, which the writer has collected and preserved show the course of conflagrations and will be found interesting and instructive: Probably no underwriter would have given much for the chances of the frame building at Keokuk, Iowa, which escaped destruction by the burning of the brick and frame block twenty feet distant; nor would anyone have supposed that the awnings, in the case of the Willow, Cal., block, would have caused the destruction of so many brick buildings. This instance fully justifies the charge for awnings in the Universal Mercantile Schedule. An entire one-story brick block was destroyed in Pensacola, Florida, some years ago, from this same cause. The Continental lost $18,000, and other companies in proportion.

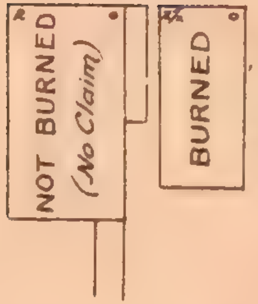


Fresno, Cal.
Fire July 1889.

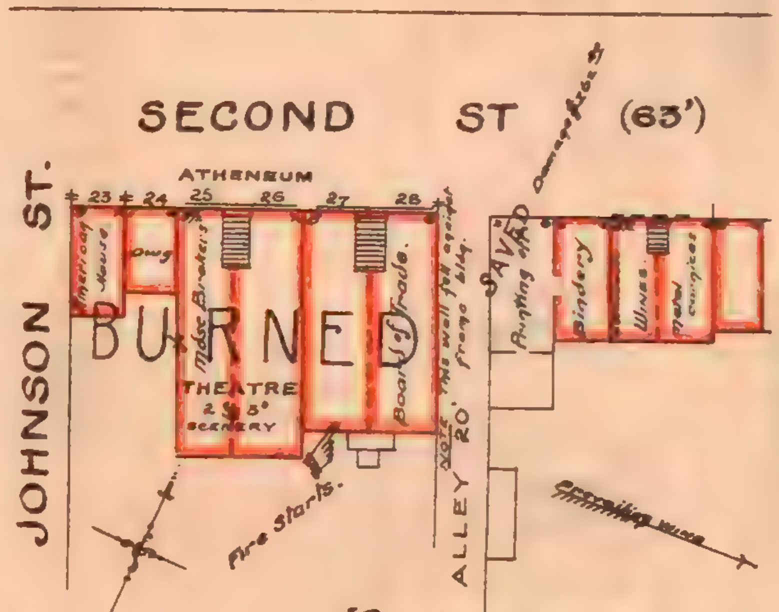




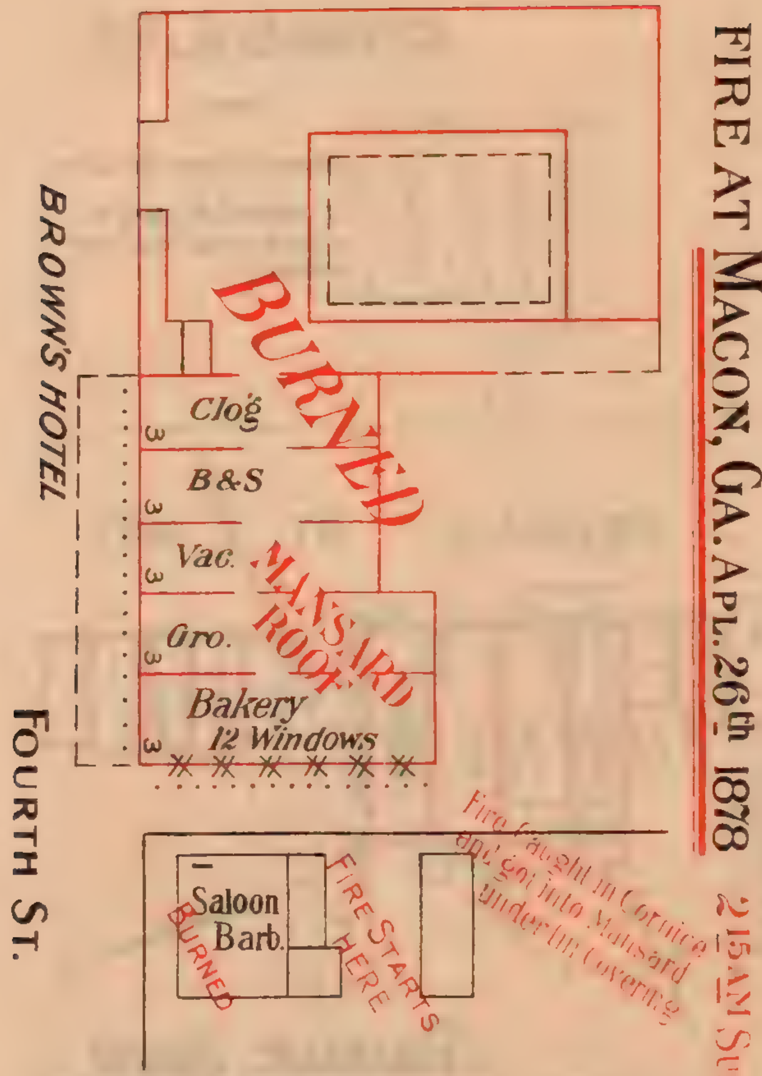
Fire at Atchison Kas.
Water facilities not good.
1 Steam Engine.



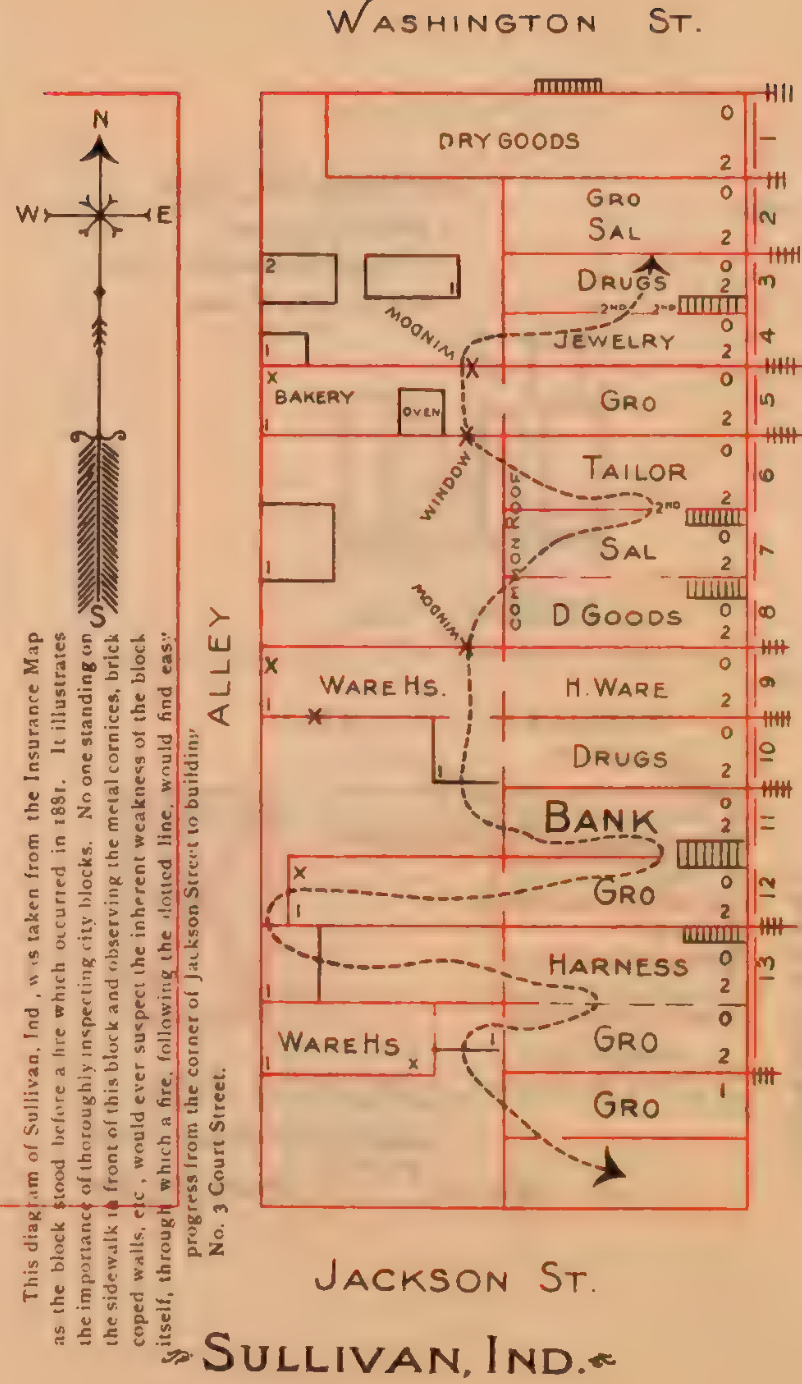
Brewsters, N.Y.
-1880-
Water from Stream.
1 Hand Engine which was out of repair.



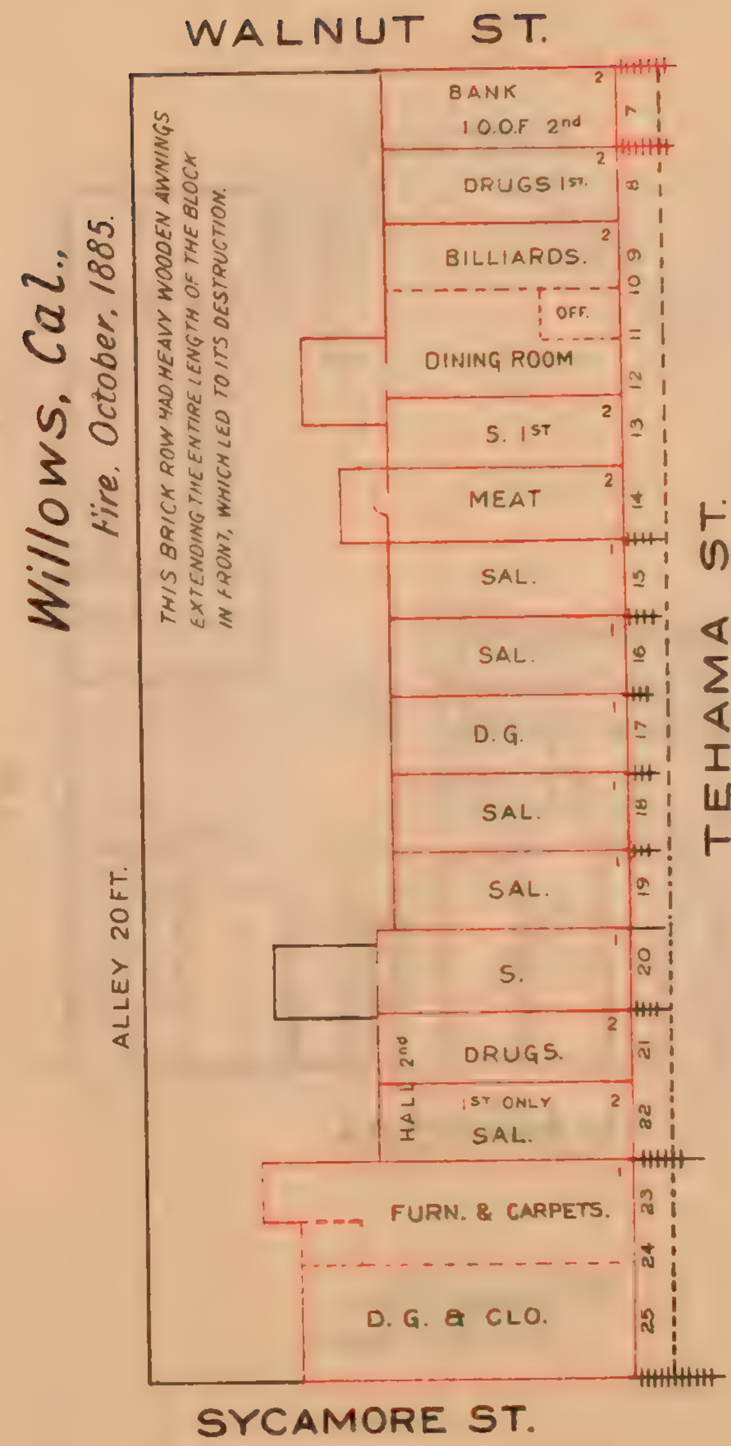
Keokuk Iowa.
Fire May 6, 1878. 2.30 A.M.
Fire dept. WATER GOOD.
2 Steamers. 2 Hand Engines.



The diagram of Macon, Ga., above affords an illustration of the importance of calculating exposure charges, and the objections to mansard roofs. It is taken from the Insurance Map, and shows a large brick hotel, which was destroyed by a fire starting in a small one-story frame barber shop, notwithstanding that Macon had five steam fire engines in its department at the time. The fire occurred April 26, 1878. Probably few agents or special agents of those who inspected the hotel building ever regarded the small one story frame barber shop as an exposure to it.



This diagram of Sullivan, Ind., was taken from the Insurance Map as the block stood before a fire which occurred in 1881. It illustrates the importance of thoroughly inspecting city blocks. No one standing on the sidewalk in front of this block and observing the metal cornices, brick coped walls, etc., would ever suspect the inherent weakness of the block itself, through which a fire, following the dotted line, would find easy progress from the corner of Jackson Street to building No. 3 Court Street.



The destruction of the buildings burned at Fresno, Cal., illustrates the danger of brick and frame buildings intermingled, but ought not to excite surprise, since the arrangement of wooden buildings among the brick does not differ from that usually employed for kindling a stove fire.

Fire shutters. These while admirable for protecting a building against fire in another building, may be a positive disadvantage in the light of observed records to the extent that they conceal a fire from outside observation. They should, in fact, never be employed unless there is an exposure. The usual method of treating them in some rating schedules, by charging for their absence, is radically incorrect. They are actually a disadvantage where there is no exposure, and their desirability from an underwriter's viewpoint should be determined entirely by the character of the exposure to which they interpose an obstruction. And yet not a few of the tariffs of the country charge for absence of fire shutters a round figure of five cents, which would imply that a building fronting on a street with a park opposite would be charged a material figure for a feature which would be a positive disadvantage and which should really be treated as a fault of management.

Within stone's throw of the place where I am writing is the block of New York buildings facing on Broadway, between Wall and Pine Streets, with Trinity Church-yard opposite. A greater number of persons probably pass this block every twenty-four hours than any other point in the United States. In view of the facts, how ridiculous would it be to insist upon iron shutters to the plate glass windows, which would, otherwise, insure almost instantaneous discovery of a fire starting inside the structures! And yet many schedules throughout the country would impose a penalty of a five-cent charge for their omission.

To the argument that the iron shutter is a protection against burglars, it would be sufficient to say that a burglar likes nothing better than an iron shutter to darken the room in which he is operating. It does not prevent his getting in, and it secures him from observation after he is in.

Wire glass is an admirable protection against an exposure fire, even a few feet distant, especially when the mullions and sash

frames are incombustible and when the glass is arranged double, with an air space between. It is claimed that heavy plate glass in small panes, with metal sash, will also resist fire for a much longer time than is sometimes necessary to protect a building from an exposing fire. Thin wire glass, however, even when double, is not equal to the "Underwriters" tin-covered fire shutter, when exposed directly to the full force of flame. Write for National Board Specifications as to wire glass.

Safe exposure distances are generally underestimated. Burning planks and shingles have been carried across wide rivers and over intervening spaces of half a mile. Such distances, however, ought not to be regarded as other than exceptional, and it would be impracticable to have rates graded for them; but in the case of large buildings filled with combustible contents, like oils, furniture, &c., ordinary exposure distances of a hundred feet, even with a good fire department, are not sufficient to insure safety. At the great fire in New York April 19, 1889, from 59th Street to 65th Street and North River, which destroyed several piers, a large lard oil refinery, storage stores, and elevators A and B of the New York Central Railroad Company, the heat from the burning oil, warehouse and storage store ignited and burned the elevators 175 feet distant. This fire, also, demonstrated the danger of burning oil while floating on harbor water, for it ignited piers from beneath. It also demonstrated the inefficiency of fire doors, already referred to, for preventing oil fires passing from one building to another. The fire loss in this case was nearly three millions of dollars, and some companies had exceptionally large lines, having overlooked the hazards referred to.

It is generally and erroneously supposed that the greatest danger of sweeping fires is in the winter, when intense cold makes it difficult to handle apparatus; but such is not the case, if experience is to be relied upon. No large, sweeping conflagration ever occurred in intensely cold weather, with the single exception of the great New York fire of December 16, 1845, where exploding saltpetre extended the area of combustion. Such fires are most dangerous after a hot summer, when everything is dry, in September, October or November, and when the heat of a fire would affect surrounding buildings just as it would individuals. One can stand nearer a hot fire on an

intensely cold winter day than in midsummer, and so can a building. Moreover, the water thrown by engines to protect surrounding buildings is apt to freeze on their fronts and offers a valuable fire screen. Fires in single buildings, however, are apt to be destructive, because of want of water and inability to handle them where intense cold interferes with the efforts of firemen; and for this reason single fires in winter, confined to the buildings themselves, often result in larger percentage damage to the structures themselves and their contents.

This view of winter fires did not occur to me until suggested by my old friend, Mr. C. B. Whiting, President of the Orient Insurance Company, with whom I was, one day, discussing the conflagration hazard.

What seem to me erroneous methods of estimating the hazard of exposures have prevailed in various sections of the country. One is to charge for a brick risk of minimum hazard exposed by one of maximum hazard, at a distance of ten feet or less, the full rate of the maximum hazard. This is manifestly incorrect, especially if the two risks are under the protection of a fire department, for it ignores the fact, already elsewhere stated, that, under the protection of a good city fire department, 75% of the fires in brick buildings are under $100, and the minor hazard would clearly escape all the partial fires of this character, so that this fact alone would warrant a lower rate.

Moreover, study of the exposure diagrams which are elsewhere exhibited in this book, indicates that, with varying conditions of wind, or perhaps by the operation of what might be called luck, even frame buildings, like that at Keokuk, Ia., sometimes escape when brick buildings are totally destroyed. In the case of the great Chicago fire, and in the case of the great Troy, N. Y., fire, frame buildings stood intact, in the midst of surrounding desolation where the heat had been sufficient to draw the pitch from knots in their weatherboarding. If frame buildings escape in this incomprehensible manner, owing to eddies and air currents which save them from the heat and ignition, brick buildings are more likely to be saved.

On the other hand, in many systems for rating exposures a uniform percentage of the exposure rate, whatever it may be,

is added to that of the risk exposed. This is approximately correct only in the case of exposures of nearly the same rate as the exposed risk. Where, however, the rate of the exposure indicates a great degree of what is called the "ignitibility" and "combustibility" hazard, the pro-rata percentage addition is not sufficient.

For example, in the Exposure Schedule which I computed to be used in connection with the Universal Schedule, the exposure of a 1% risk to a 1% risk at ten feet distant, with openings in both buildings, is 18 cents, or 18% of the exposing hazard. But the exposure to a 1% risk by a 7% risk, at the same distance, would be not 1.26 (18% of 7%), but 3.42, which added to the 1% of the risk to be rated would make the two risks respectively 4.42 and 7.18.* This result is reached by treating each 100 cents of excess in rate as a separate 1% exposure with cumulative effect, each 1% representing a layer of extra hazard (see explanation in the Schedule). At these two figures, viz., 4.42 and 7.18, it would be a matter of indifference to an experienced underwriter as to which risk he should take, whereas if only 18% pro-rata of the 7% risk (the same percentage as is taken for the 1% exposure), or 1.26, should be added to the 1% risk, the resulting rate would be 2.26 for the exposed risk against 7% for the exposure. At this difference, an experienced underwriter would take a small line on the 7% risk and decline the 2.26 risk.

Again, a 7% risk exposing a 7% risk, by the same table, would add only 1.26, which would be the mutual exposure of the two risks to each other, and each would be 8.26, at ten feet distant, with openings.

It will thus be seen that a 7% risk exposes a 1% risk by a greater amount than would be added to a 7% risk; and the explanation is obvious and simple. It is this: An approximate test of the sufficiency of an exposure charge of two buildings, with a ten-foot separation and openings in both exposed walls, would be to compute the rate of the two buildings as if they were one risk, with the combined areas, additional tenants, additional staircases, &c., &c. This would imply, of course, that the 1% area and cubic contents of the 1% building *should be brought to the hazard of the 7% building.*

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* 7% + 18 cents for the 1% exposure.

Let us take, for example, two buildings of 5,000 square feet of area, (50 x 100); if they should adjoin, with doors cut through on every floor, any experienced underwriter would bring the 1% building up to the rate of the 7% building. This would require a greater addition to the 1% rate than the pro-rata of the 7% hazard. In the case just cited, it would be 3.42; whereas if both were 7%, the area of the exposed building ten feet distant being already rated at the proper figure to measure its ignitibility and combustibility, there would need to be added only the charge for increased area, (10,000 square feet) additional staircases, elevators, tenants, &c., &c.

I think this demonstration of the matter would satisfy anyone as to the correctness of the principle on which the exposure tables have been computed.

The system of charging for exposures in another portion of this work (for which see "Charge for Exposures" in index) has been carefully computed and will, it is believed, correctly measure the danger to buildings of ordinary construction The table for computing exposures has not yet been arranged for fireproof structures.

Exposures to Fireproof Buildings. Probably no class of risks is more inadequately treated in the matter of computing the danger from exposures than fireproof buildings, because rating bureaus so frequently overlook the obvious fact that plate glass and wooden window frames and sash are not fireproof, and that a so-called fireproof building offering nothing more substantial to an outside fire than plate glass has no greater fire-resisting properties than an ordinary show-case would present. More than 75% of the "fireproof" structures of the country have window openings to the extent of from 40% to 75% of the superficial area of each enclosing wall without fireproof shutters. Heat from a burning building across a wide street finds ready entrance through such openings, and the various fireproof floors serve only to hold, like a great gridiron, ignitible merchandise in the most favorable form of distribution for ignition and combustion, to the full force of an outside fire. If fire once secures entrance to a fireproof building through the windows of any story, the contents of such story, especially if at a great height from the ground, are almost certain to be destroyed; and the

danger of ignition is greater where the fireproof structure is higher than the one which is burning. If any underwriter were estimating the proper charge for the danger to a frame building he would not overlook the fact in fixing his rate; and yet the plate glass windows and wooden frames and sash of a fireproof building do not interpose any better protection than wooden clapboards or shingles. Nearly all the serious losses in fireproof buildings to date have been caused, not by interior fires, but by exposure fires; notably the Horne Building, in Pittsburg, burned by the destruction of the Jenkins grocery; the Home Life Building, in New York, burned December 4, 1898, by the adjoining mercantile building; (see pages 121, 122) the Manhattan Savings Bank Building, burned November 4, 1885, by a fire across the street; (see page 123) the Temple Court Building, New York, suffering serious damage by fire entering the windows of one story from those below through the court, &c., &c.

Fireproof Buildings as exposures. A fireproof building, on the other hand, is not a serious exposure to others, because the heat of its burning contents would not escape from openings of the size of windows with sufficient intensity or volume to damage a structure a few feet away, on the principle that a stove, even at white heat, does not permit sufficient heat to escape from its open door to endanger substances a few feet away. The maximum danger point of a burning building is when its walls and floors collapse and allow the escape of enormous heat suddenly released with an intensity sufficient to shrivel up surrounding structures, unless of unusual fire-resisting construction.

CONSTRUCTION OF BUILDINGS.

This, it is unnecessary to say, is an important subject, involving questions of resistance to fire, as well as weight-carrying capacity, and, therefore, problems of engineering, as well as of architecture.

The best fire-resisting material for walls, it may safely be asserted, is hard-burned brick. It is also the best material for the floor arches between the iron beams of fireproof buildings. It is incomparably better than stone, because stone is utterly unreliable for resisting fire, especially the lime stones, granites, marbles, &c. In fact, stone is a dangerous material wherever it is subjected to fire and water and carries a heavy, superimposed weight. After the great Boston fire, granite piers and columns were shoveled up like so much sand. Notwithstanding these facts, stone enters into most ordinary structures to the extent of being incorporated as important members of piers and walls. In some cases piers or columns are built entirely of stone. Such architecture is almost certain to result in disaster, especially where stone is a weight-carrier and is located in the interior of a building and subjected to the combustion of surrounding merchandise. In the outer walls of a building it is not so dangerous, although almost certain to be defaced in a facade to the extent of requiring replacement. In interior construction, even where bond stones and cap stones are used only in brick piers, it may wreck the building.

The illustrations from photograph reproductions of brick piers in the Cammeyer Building, New York, almost ruined by a fire, show this danger. The cap stones and the bond stones were of granite and nearly two feet in thickness. They were cracked by the intense heat and the application of water and then failed to answer their purpose, which, of course, was to distribute their load over the entire surface of the pier. The result was

CAMMEYER BUILDING, NEW YORK.

FIRE, JANUARY 18, 1899.

DAMAGED BRICK PIER SHOWING EFFECT OF FIRE ON STONE CAP AND BOND STONES. INTEGRITY OF PIER LOST.

CAMMEYER BUILDING, NEW YORK

FIRE JANUARY 18, 1899

DAMAGED BRICK PIER SHOWING EFFECT OF FIRE ON STONE CAP AND BOND STONES. INTEGRITY OF PIER LOST

that the weight of the girder and its load fell upon a smaller section of the brickwork, the latter yielded, as shown by the cracks, and but for the admirable work of the New York Fire Department, and also for the fact that the basement, fortunately, was not filled with more combustible merchandise than boots and shoes in cases, the central girder would have come down, with its entire load, wrecking the building.

The combustion in this case was not of sufficient intensity even to destroy all of the wooden cases nor all of the merchandise. In the same room with these piers were naked six-inch cast-iron columns, which carried their loads without yielding. It seems to me it would be hard to find a better illustration of the danger of using stone for either bonds or caps in important weight-carrying piers than this fire affords.

One of the most convincing evidences of the utter unreliablity of stone, especially granite or marble, for building purposes, was observed in Washington at the time of the inauguration ceremonies of March, 1901. A large granite post, four feet square, at the entrance to the grounds of the War Department was ruined by the burning of a light wooden stand erected for observing the procession. When the small amount of fuel is taken into consideration, and the fact that this stone column stood out of doors, with a free circulation of air, where the fire department could work to the best advantage, with the result that it dissolved like so much loaf sugar, one can readily imagine what would be the consequences of relying on just such a sturdy column located in a cellar, surrounded with inflammable material on fire, and carrying the weight of a building.

The apathy of building departments, of architects, masons and legislators and of some underwriters, in this matter of the danger of stone as a building material, is utterly incomprehensible to me. If columns in a building were constructed of glass or of porcelain there would be an immediate outcry; and yet well annealed glass, terra cotta or porcelain would actually stand the effect of fire and water for a longer time, probably, than granite or marble columns.

Some day, a terrible loss of life, due to this strange disregard of the laws of safety, will educate the community to the danger to which I have called attention, unless, indeed, the

fire should destroy all evidence of its cause, as has been the case undoubtedly too often in the past. The Cammeyer Building, whose granite bonds and caps came so nearly wrecking the structure (Chief Bonner thinks the piers would not have lasted more than half an hour longer), would, in its collapse, have destroyed the evidence of its undoing as surely as the falling temple of Gaza destroyed the Sampson who pulled its pillars from beneath their superimposed load.

The writer found in the basement of a large, otherwise well constructed building, in St. Louis, a fore and aft girder, on which the floor joists impinged, supported throughout its entire length by stone columns—rough monoliths, just as they came from the quarry. These would unquestionably have yielded to any ordinary fire and let down the structure. The owner was surprised when informed that underwriters would prefer 12-inch wooden columns. A better construction, however, would be cast-iron columns, covered with not less than four inches of incombustible material, like brick or porous terra-cotta.

As already stated, all ironwork should be protected by incombustible material, and inasmuch as wrought iron is certain to rust unless kept well painted and oiled, and, therefore, would rust out of sight if covered up, while cast-iron will rust only to the thickness of a knife blade, the latter is a better material for columns, especially where it is to be covered up by fireproofing.

Even so eminent an authority as Mr. Edward Atkinson, who has contributed so much to knowledge of construction, in the treatise on standard mill construction of June, 1899, recommends boiler iron for bonds in piers. I would advise using cast-iron in all cases, as wrought iron would rust to the point of destruction and injure the integrity of the pier. Cast-iron, also, should alone be used for wall plates or templates.

There may be said to be four systems of construction: "Fireproof"; "Slow Burning", or so-called "Mill Construction"; ordinary "Brick, joisted construction", and "Frame". I shall endeavor to treat of each of these, paying due attention to the experience of underwriters as to losses and to the most reliable opinions I have succeeded in getting from engineers, architects and other practical experts.

It may be well before treating of these in turn, however, to dwell upon proper rules of masonry which would apply to all: and, first, as to materials.

Bricks. All bricks should be good, hard, well burned bricks. This may be determined by breaking a brick, to see that the inside is thoroughly burned and hard. In every kiln there is a certain amount of what is known as "pale" or unburned brick. It is unfit for construction. Some bricks, also, have rough surfaces, boils, swells, etc., and do not make a good wall. They should be discarded.

Sand. The sand used for mortar in all buildings should be clean, sharp, grit sand, free from loam or dirt. This may be tested by rubbing it between the fingers and holding it to the ear, to detect the gritting sound indicative of sharp sand; or may be determined by examining the grains through a small magnifying glass to see that they have sharp edges, or by rubbing it in the palm of the hand to see that it does not discolor, which would be an evidence of loam. It is very important to have good sand, else the mortar will not be reliable. As a rule, river sand is bad, too smooth from attrition and should not be used.

"**Lime mortar**" is made of one part of lime to not more than four parts of sand. The lime should be thoroughly burned, of good quality and properly slaked before it is mixed with the sand. It should be slaked in a box made of boards, or planks, with plank bottom, 12 inches deep, and water-tight. The lime should be introduced one cask at a time, to which two barrels of water should be applied; the whole covered up until the result is a smooth uniform paste. Lime should not be slaked on the bare ground, and yet this is the common practice; and the water should be added in volume, by upsetting a barrel as quickly as possible.

The lime should be properly stirred while slaking, and when made in this way may stand for weeks, unless cement is added, in which case it must be used at once.

It is probable that no feature of construction is so neglected as this simple but vitally important matter of making mortar. It is usually entrusted to an ignorant laborer who knows nothing whatever about the matter and cares less. Good mortar

is a chemical reaction of silica and lime, resulting in "silicate of lime," and is not a mere mechanical mixture, such as most persons suppose it to be. It is vitally important that good lump lime and "sharp" sand should be used (air slaked lime should not be used.) Properly mixed, it will last for years, and is better for use after being kept awhile. Probably the great tenacity of the ancient Roman mortar observable to-day in structures still existing was due to observation of these important precautions.

"Lime and Cement Mortar." Lime and cement mortar should be mixed one part cement, three parts sand, and one part lime.

"Cement Mortar." Cement mortar should be mixed one part of cement and three parts sand. It is stronger if mixed one to two. Where Portland cement is used the test is that it should sustain a tensile strain of 120 pounds per square inch after being one day in air; and 300 pounds per square inch after one day in air and six days in water. If other than Portland cement mortar is used, it should stand 60 pounds per square inch after one day in air, and 120 pounds per square inch after one day in air and six days in water.

Concrete. Concrete for foundations or for covering cellar floors should be mixed one part cement, two parts of sand, and five parts of washed gravel, or clean, broken stone of such a size as to pass, in any way, through a two-inch ring. It should be measured accurately, thoroughly mixed dry, before water is added, and should be, when ready for use, capable of standing on a reasonably steep slope without the water running from it. It should then be rammed carefully in place, until the surface is moist, and should be protected from disturbance, by walking or otherwise, for at least twelve hours.

Although the underwriter is not supposed to keep track of such matters, he can if he will, while watching the processes, do much to secure good masonry and be of practical assistance to his customer, who may be ignorant of such subjects, and so save him from having a poor building, in case his architect is not careful or his contractor not honest.

BRICK WALLS.

All bricks in walls should be laid carefully, every sixth course

being a "header" course; that is, the bricks of each sixth course should be laid with the small end showing in the face of the wall, crossing the course below of the "stretchers," or bricks laid lengthwise with the wall. This ensures a proper "bond". Under no circumstances should a wall consist entirely of "stretchers". If, however, "face bricks," enameled or otherwise, are employed, a row of headers would be objectionable. In such cases the bond can be secured by clipping off the corners of the stretchers and laying the headers in the angle so that they bond the course below.

Where beams or girders rest on the bearing walls there should be templates of cast-iron, to distribute the weight, so that the entire weight may not rest on a single brick but be distributed over a considerable surface. This is very important, especially in the case of iron or steel beams. Stone is not good for templates, although generally used.

A wall should not have a greater percentage than *twenty-five per cent* of its superficial area in openings, windows, doors, thin portions, recesses for alcoves, chases or channels for water, gas or other pipes, unless strengthened with piers to make up the difference; and no chase or channel should be constructed in any pier, nor should a chase be constructed in any wall for more than *one-third* of its thickness; and there should be not less than eight inches of solid brickwork back of any recess. This is important.

That portion of a wall which is below the ground, and that portion which extends above the roof should be laid in cement mortar, but no cement or plaster of Paris, which when used in mortar is known as "gauged mortar," should be used around the ends of wooden floor beams or girders. Lime mortar does not rot wood nor rust iron; the lime seems to be a preventive of rust as well as of decay; but cement or plaster of Paris is almost certain to rust iron and rot wood. Dry rot may soon eat off the bearing section of a beam or girder. A building which is being taken down on the opposite side of the street from the building in which I am now writing has been constructed in this way, and the ends of the floor joists or beams are thoroughly decayed. It is a grave question how much longer they would have lasted, or whether they would have

carried the weights incident to stores or warehouses. The building has been occupied for offices.

In one instance coming to my attention, where the cracks around the floor joists in the wall of a church had been pointed up with plaster of Paris, the joists rotted to the point of yielding under the weight, so that the floor fell.

The requisite thickness of a wall, especially of a bearing wall—*i. e.*, that which carries the floor joists or girders, usually the side walls—depends on its height and length. The Universal Schedule standard wall is 12 inches for the thinnest portion, at the top, increasing four inches with each story to the bottom; so that a four-story building would have for its fourth story 12 inches; third story, 16 inches; second story, 20 inches, and first story 24 inches—an average of 18 inches. A charge is made for variations from this standard, determined by adding the thickness of the various stories of a building to be rated and dividing by the number.

Party walls should be four inches thicker than independent walls.

The New York Building Law requires in a building 60 to 75 feet in height, for warehouse or mercantile occupancy, walls 20 inches in thickness above the foundation walls to the height of 25 feet, or the nearest tier of beams to that height, and thence not less than 16 inches to the top. This would be a good wall, but the advantage of the wall recommended as standard by the Universal Schedule, is that it would present, at each story, a ledge for carrying the floor joists and make unnecessary their insertion for too great a distance in the brickwork; and, moreover, would present a greater thickness, especially at the bottom, in case of fire in an adjoining building—a very important matter, which architects and builders too frequently overlook. It should be borne in mind that the thickness of walls recommended by the Universal Schedule is not intended merely for carrying capacity as bearing walls, (a thinner wall would answer for that purpose) but is intended to exclude the heat generated by a fire in an adjoining building, and should be required in the compact portions of all cities, where every man should be compelled to build with reference to the safety of his neighbors. Architects and builders generally seem to have in mind only the carrying

capacity of walls, and to lose sight of this important fact. As the contents of buildings burn they sink to the bottom, where enormously high temperatures are sometimes reached, not unlike those of an iron forge or smelting furnace. It is for this reason that walls should increase in thickness as they approach the bottom, on the same principle that smelting furnace walls are thicker at the bottom than at the top. It is the generally accepted opinion that a 12-inch brick wall will prevent the passage of fire, but a much thicker wall may fail to confine the heat of a burning building sufficiently to prevent the ignition of combustible merchandise or other material in an adjoining building.

Several years ago a wooden post partially built into the brickwork of a boiler setting in Mill No. 1 of the Cocheco Woolen Company, at Rochester, N. H., was ignited, although twenty inches of brickwork separated the wood from the inside of the boiler setting. The heat of a burning building would be much greater than that generated in this case, and the instance cited substantiates my claim.

In an isolated location an owner might well be permitted to construct his walls with reference only to their carrying capacity, but where he builds in the compact part of a city, storing combustible materials from cellar to roof, he should be required so to build that a fire in his premises will not necessarily destroy a neighbor's property. He may, with propriety and without injustice, be compelled to observe a law which will, in view of the fact that the buildings of his neighbors outnumber his own a thousand to one, insure that he will be, in that proportion, the gainer by rules which secure the safety of all though imposing burthens on himself.

If an architect were required to draw specifications for a building adjoining others, with the knowledge beforehand that its entire contents, from cellar to roof, were to be totally consumed, and he were under a bond to pay for damages to surrounding properties, he would not be more severe in his exactions than should a building law designed to protect neighborhood rights in the enjoyment of property. A mercantile or manufacturing building in combustion sometimes generates a greater heat than a smelting furnace.

In some of our Western cities the practice is growing of using

hollow tiling, 8 inches thick, bonded like ordinary brickwork, for enclosing walls, the weight being carried by iron columns riveted to the beams and girders, making a strong cage-like structure. A fire in such a building would result in the destruction of the thin, 8-inch tile-work and would leave the various stories exposed, like that of the Leonard Building, in Detroit, destroyed in October, 1897, which was an example of the great danger of this style of construction. It was ten stories high, and as fast as the columns or wall girders were warped by the heat the tiling dropped out like loose bricks, leaving the entire structure, after the fire, a ragged cage-work of iron, with very little of the tiling on the enclosing walls and few of the floors intact. The contents were, of course, totally destroyed.

Another instance of the destruction of this class of building may be found on page 108.

If buildings should be constructed on the lines herein laid down the conflagration hazard of cities would be so materially reduced that current rates would afford underwriters a fair profit.

Parapet Walls. The walls of a building adjoining another should be carried through and above the roof to the height of one foot (three feet in the case of warehouses,) so as to cut off the roof beams and prevent fire passing from one building to another. The great Boston fire owed its dimensions largely to the fact that whole blocks had been constructed without reference to this important feature. In some cases it was possible to walk from one building to another through common attics throughout an entire block.

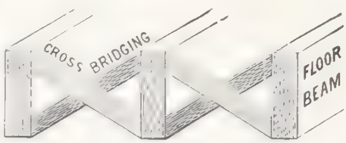
STONE WALLS.

Stone walls should not be less than 18 inches thick in any section, even if the wall is built of coursed stone, with dressed level beds and vertical joints. Stone walls should have "headers" at least 12 inches in width and 8 inches in thickness every three feet in height of the wall, extending clear through it. No stones should be used for "stretchers" that do not bond or extend into the wall at least six inches, and no stone should be laid in a wall in any other position than on its natural bed. The stone should be firmly bedded in cement mortar and all

spaces and joints thoroughly filled. It requires a much better workman to lay a stone wall than to lay a brick wall, and for this reason and for the further and more important reason that stone, as already explained, yields readily to fire and water, brick walls are better than stone for fire-resisting purposes.

FLOOR BEAMS AND JOISTS.

These should never be less than 3″ x 10″, spaced 16 inches on centres (which would bring them 13 inches apart), "cross-bridged" by "herring-bone" bridging 2″ x 3″ every five feet. This makes a rigid floor. 3″ x 12″ joists are preferable to 3″ x 10″ and are cheaper in the long run. The size of the beams, however, should be determined by the clear span and the character of the load. For 16-foot spans, not less than 3″ x 12″ should be used in any case.



CROSS BRIDGING OR STRUTS BETWEEN FLOOR BEAMS.

All wooden story posts, pillars or columns should be not less than 12 inches in diameter. Fire seldom invades a post of this size to a greater depth than two inches, which would leave sufficient weight-carrying capacity to support the superimposed load.

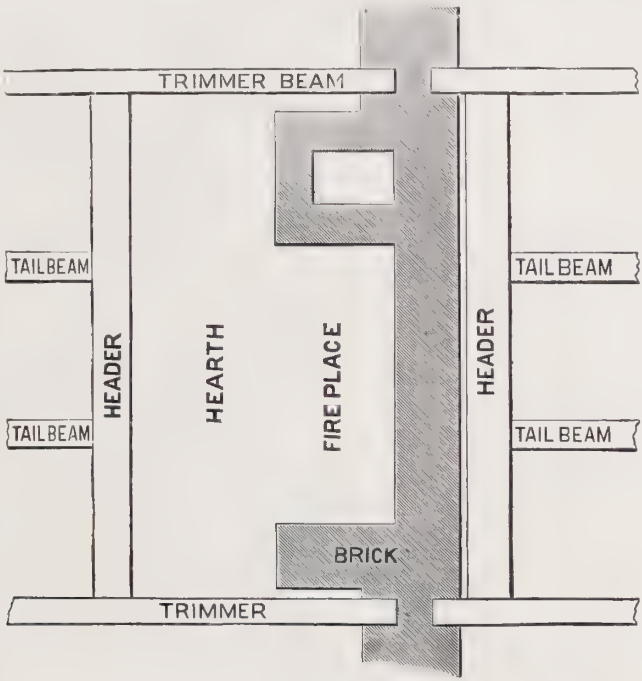
For mill construction the floor beams, also, should be 12″ x 12″.

A mistake frequently made in erecting buildings is to rest floor beams and girders at one end on a brick or stone wall, which when the masonry is set becomes immovable, and the other end on a wooden partition, which will yield as it becomes dryer, from shrinkage, thus disturbing the levels and, in the case of furnace flues or chimney flues, resulting in cracks which may be dangerous, to say nothing of injury to plaster. It is true that wood shrinks very little lengthwise, but there is nearly always, at the top or bottom of a partition, wood in a horizontal position, where the weight is at right angles with the grain or fiber of the wood, and shrinkage will inevitably have the effect described. An insurance agent will prove a good friend to his

customer erecting a building if he watches for and points out such faults.

The ends of all wooden floor and roof beams where they rest in brick walls should be cut to a bevel of three inches of their depth. This would permit of their falling, in case of being burned through in the middle, without prying out the wall; in other words, it would make them "self-releasing."

In no case should the end of a floor or roof beam be supported on stud partitions, except in frame buildings.



FIRE PLACE SHOWING HEADER, TRIMMER AND TAIL BEAMS.

All wooden beams should be "trimmed" away from flues in chimneys, whether the same be smoke or hot air. The "trimmer" beam—*i. e.* the one that runs parallel with the side of the chimney—should be not less than ten inches from the inside face of the flue and not less than two inches from the outside of the chimney breast, and the header beam not less than twenty inches from the outside face of the brick or stone work of the chimney. If the flue is intended for boilers or furnaces the

trimmer beam should never be less than 16 inches from the inside of the flue. The "header" beam, in front of a fireplace, which supports the trimmer arch and which carries the "tail" beams of the floor, or those beams which are mortised into it, should be not less than 20 inches from the chimney breast—24 inches would be better.

Illustration, page 89, shows the proper construction of a flue and the trimmer arch for the hearth.

The agent should keep supervision of a building in process of construction, especially as to flues.

The wooden centres under the trimmer arches of hearths should be removed before the plastering on the underside of the ceiling below is finished.

Each tier of beams should be anchored to the side, front, rear or party walls at intervals of not more than six feet apart, with good, strong, wrought-iron, *self-releasing* anchors not less than $1\frac{1}{2}$ inches by $\frac{3}{8}$ inch in size, well fastened to the side of the beam by two or more nails made of wrought-iron at least one-fourth of an inch in diameter.

Strength of beams.* The safe carrying capacity of wooden beams for uniformly distributed loads is determined by multiplying the area in square inches by the depth in inches and dividing the product by the span of the beam in feet. This result is multiplied by

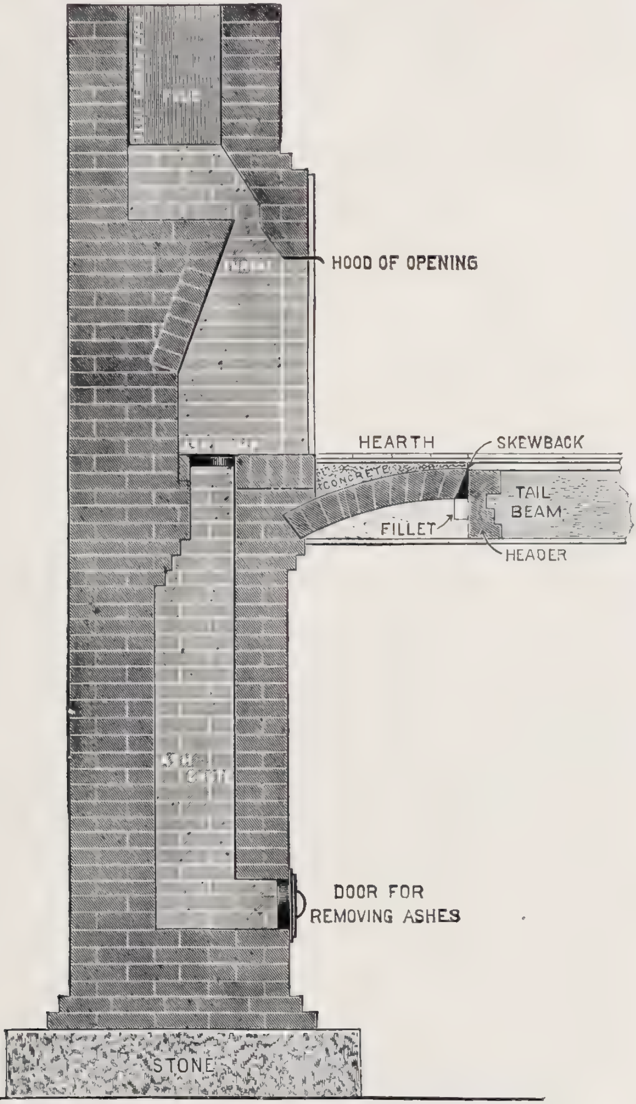
70 for hemlock,
90 for spruce and white pine,
120 for oak,
140 for yellow pine.

In computing stresses. allowance should always be made for the greater weight of merchandise when soaked with water thrown by a fire department, as already explained—an important matter too frequently overlooked by inspectors.

Arrangement of merchandise as to overloading. &c. An intelligent inspector will examine carefully with regard to the loading of floors. Sometimes the stresses are increased to a point where even sound timber, not invaded by fire, is in danger and, therefore, to a point where the floor would give way if the beams or girders should be even slightly charred. For heavy machinery,

*For illustration, see page 605.

HOW TO BUILD A CHIMNEY.



SECTIONS OF CHIMNEY SHOWING TRIMMER ARCH UNDER HEARTH. PROPER CONSTRUCTION OF FIRE PLACE, FLUE AND FLUE LINING, ASH CHUTE. ETC.

a building should be specially constructed, and the strength of materials should resist a load of from three hundred to five hundred pounds per square superficial foot.

In places of public assembly, the loading should be for not less than 120 pounds per square foot, especially in buildings where dancing or other rhythmic movements, or the steady drilling of troops, would place an unusual and systematic pressure or strain on the floors, like the effect of concussion. It is a known fact that troops are always required to break step when crossing bridges. The difference in strain is practically that of the difference between the pressure of a weight resting quietly on a surface and the strain of the same weight dropped from a height of a foot or two.

Aisles from Windows. It is important that merchandise should be so arranged on floors that aisles be left in front of windows, so that a fire starting in the interior may be observed from the outside. Where buildings are located on traveled thoroughfares, an important advantage is lost if a fire cannot be detected by pedestrians at any hour of the day or night. A few years ago the store of Messrs. Balderson & Daggett, on a crowded thoroughfare in Boston, was not discovered at noonday to be on fire until after it had been burning for a considerable time in the interior of the stock. The goods had been so piled as to obscure the windows, and a loss of three hundred thousand dollars resulted.

Fibre Storage. It is also very important that in fibre stores and warehouses containing cotton, hemp, jute, &c., space should be left between the fibre and the side walls to allow for swelling or expansion when the material becomes wet with water thrown by the fire department. The expansion of fibre where it is packed close is sufficient to push out the side walls of a building and to cause a total loss.

Floors should be double. So-called "mill construction" or "slow burning" construction would require not less than three inches of solid spruce or other plank, tongued and grooved, a layer of waterproof paper and a floor surface board $\frac{7}{8}$ inch thick—in all about four inches of solid flooring.

Tin or sheet-iron dipped in red lead inserted between the floors would make an admirable fire-resistant.

"Chases" or "channels" for pipes, electric-light wires, &c., should be fire-stopped at each story, as already explained under the head of Inspection. In short, for warehouse and mercantile purposes, there is no reason why every floor should not be thoroughly cut off from the other floors; the stairways, elevators, &c., being in a hallway separated by a brick partition, with door openings protected by self-closing fire doors.

Metallic lathing is infinitely preferable to wooden lathing, not only because it is a better fire-resistant, but because it insures good work on the part of the plasterer, who, to get a sufficient "key", must use a proper amount of plaster. It will also stand a greater amount of fire and a greater amount of water without damage than wooden lathing. It is also good for partitions.

Staircase treads should never be of stone, unless a web of iron is underneath the stone, of sufficient strength to afford a footing for firemen and tenants in case of fire. Stone will yield to fire, and a staircase with such treads would become impassable early in the fight. In fireproof buildings it is quite common to see staircases with marble or slate treads, let into iron rabbets in an iron frame. They are exceedingly dangerous, unless cut off in a fireproof hall, and even then should be reinforced with iron treads underneath the stone, as already suggested.

Stair treads might be constructed with iron frames and a fireproof composition tread, like Lignolith—a composition which can be laid like cement in a plastic state, and sets hard in about twelve hours. It is claimed to be a good filling for fire doors, between two metal sheets; but at this writing I have not learned of any severe test of it in this form.

Fire Stops. An important requisite in all construction is to provide fire stops, especially in hollow spaces between studs from one story to another, so as to prevent drafts. Solid construction is an enemy of fire; hollow construction, affording drafts, its best friend. Staircases, elevators, well-holes, chutes, dumb-waiter shafts and channels for gas, steam or other pipes should be cut off at each story, so that they may not prove conveyors of flame from one floor to another. In the case of well-holes, this is, of course, impossible, and the result is nearly always the destruction of the building and its contents, as was

the case in the two fires in the Horne building at Pittsburg, as a well-hole simply converts the whole structure into one compartment, like a cylinder stove.

The great secret of fire-resisting construction, as heretofore explained, is to avoid drafts and hollow places especially in side walls or partitions. Solid, substantial finish is necessary to produce a standard structure. Hollow spaces are apt to conceal nests of rats and mice, which carry to them oily waste or other dangerous material (even friction matches) to be used in the construction of their nests, which, almost invariably, are placed in the warmest places, sometimes in contact with steam pipes, where spontaneous combustion may result.

At one of the earliest meetings of the Universal Schedule Committee, Mr. E. G. Richards reminded the Committee that the vertical openings of buildings of this character had been important factors in the fire loss, fires seldom passing through floors even of the ordinary character with plastered ceilings below, with such rapidity as to prevent holding the fire until the city fire department can arrive on the ground. I was impressed, at the time, with the importance of his suggestion, and have never had reason to regret the method in which the Universal Schedule charges in its rate for these openings from story to story, in items 67 to 75 inclusive.

There is really no reason why all warehouses should not be so constructed as to make each floor a separate fire risk for at least the initial twenty minutes of combustion. This would give the fire department time to locate the fire and get streams upon it, with the chances largely in favor of extinction. If one-half of the annual fires in warehouses could be confined to the floors on which they start, the insurance companies would secure a profit and the loss record of the country would be materially reduced. Of course, this is possible in fireproof construction and in slow-burning construction; but even in ordinary brick buildings it would be possible, at slight additional expense, to secure construction which would hold a fire, for fifteen or twenty minutes, to the floor on which it starts. It is unnecessary to suggest that every minute gained at the inception of a fire is important.

Elevators and staircases, as already suggested, may be cut off

in a hallway separated by a brick wall, communicating with the rooms by fire doors. This construction, however, is seldom found outside of warehouses.

Dumb-waiter shafts should be of incombustible material, and should have fireproof doors at each story.

Cellar Floors. These should be covered with three inches of good concrete, finished with one inch of Portland Cement and sand in the proportion of one of cement to two of sand.

Concrete cellar floors and foundation walls laid in cement are necessary not merely to insure dryness of the floor and as a precaution against dampness, but as an important protection from a fire viewpoint. In case of fires in neighboring buildings, especially in locations where the soil is sandy, stocks in cellars may be seriously damaged by water. At the great fire in Worth Street, New York, January 17, 1879, the companies had to pay heavy losses by reason of leaking walls. Goods in cellars, hundreds of feet from burned buildings, were damaged by the water thrown by the fire department, which percolated through the cellar floors and the foundation walls. For this reason cellars should be water-proof. The outside of the foundation wall can be protected with a heavy course of strong building paper, well smeared with liquid asphalt, in addition to having the wall laid in cement.

It is well to have a drain to the sewer, from the cellar, properly trapped, to carry off surplus water. And in case of a steam plant, with force pump, &c., the boiler-room and pump-room should be so arranged that water thrown by the department on the floors above may be carried off without forcing the engineer to leave his post at an early stage. In order that he may be encouraged to remain to the last, he should have ready access provided for his escape to the street, without making it necessary for him to go through the building.

Grouting. Grouting is liquid cement poured in to fill up the interstices in walls while being laid. It improves brick walls, but is objectionable in stone walls and should not be permitted in them.

Private Electric Plant, Dynamo-Room, &c. This should be in a dry location, and no water or sprinkler pipes should be allowed to pass over the switchboard. The plan now is to have a water-

proof hood over the switchboard. A good floor for a dynamo-room is one made of $\frac{3}{4}$ inch deck glass, covered with rubber matting, to prevent the man in charge from slipping. He is thus, with glass and rubber, constantly insulated while working about the dynamo, and the arrangement is preferable to a wooden floor not only for this important reason but, also, because a wooden floor is apt to become oil soaked, while a glass floor can easily be kept clean.

Vertical Pipes for fire-extinguishing purposes should be from four to six inches in diameter, according to the height of the building, with Siamese connection at the street for the use of the city fire department. They save the time of carrying hose up stairs in case of fire. One six inch riser pipe may be made to do duty for two adjoining buildings or compartments by erecting it in the dividing wall with hose outlets on each side of the wall. The pipe should always be near stair landings, however, so that a play pipe can be held to the last moment.

Water Tanks for supplying sprinklers or vertical pipes should be supported by brick walls and iron beams, so arranged that they will hold their places to the last. They usually rest upon the corner of the building. If wedges are used they should be of iron. This is a very important matter. In the case of the "fireproof" Horne Building, in Pittsburg, the tank gave way owing to an improper disposition of the beams carrying it. Tanks supported on wooden beams are extremely dangerous. In case of their giving way the enormous weight of the water and tank is liable to wreck the building and endanger the lives of firemen.

Iron Fronts. Buildings with iron fronts are objectionable when in blocks, because of the usual neglect of builders to fill in the back of the iron with brickwork, as required by most building laws, so as thoroughly to cut off all connection between the two, especially where two buildings adjoin each other, and more particularly in the case of sloping or mansard roofs. At the time of the great dry-goods fire in New York, on the night of January 17, 1879, which destroyed nearly three millions of dollars in value, the writer, standing on the opposite side of Worth Street, could not understand the passage of fire from one store building to another, of structures supposed to be sepa-

rated by fire walls. It was afterwards explained by the discovery of the fault referred to. At the eaves, in the most dangerous sections of the dividing walls, there was practically nothing to prevent the passage of fire from one building to another; and before the firemen on the street, ignorant of the faulty construction, could understand the matter, the fire had gained headway throughout the block, with disastrous results.

These general specifications for fire-resisting construction will probably not need greater elaboration for the intelligent agent, as he can easily acquaint himself, if he desires, with the minor details which are to be found in the ordinary text-books for the use of architects and builders, though frequently intermingled with other matters of picturesque, artistic effects, &c., tending to conceal their practical importance. More attention is usually devoted in architectural books to such matters as finials, gargoyles, cornices, &c., &c., than to the all-important subject of protection from fire.

Having dwelt upon the more important portions of a building, it may be well to specify the requirements of a standard building, and I cannot accomplish this better than by taking the standards of the Universal Schedule, as follows:

"A standard non-fireproof building is one having walls of brick or stone (brick preferred); not less than 12 inches thick at top story (18 inches if stone), extending through and 36 inches above roof in parapet and coped, and increasing four inches in thickness for each story below the ground—the increased thickness of each story to be used for beam-bearing ledges; ground floor area not over 2,500 square feet (or 25 x 100); height not over four stories, or 50 feet; floors of two-inch plank (mill construction requires three inches), covered by ⅞ or one-inch flooring, crossing diagonally, with waterproof paper or other approved waterproof and fire-resisting material between; wooden beams, girders, and wooden story posts or pillars twelve inches thick, (or protected iron columns); elevators, stairways, etc., cut off by brick walls or by plaster on metallic studs and lathing; communications at each floor protected with approved tin-covered doors and fireproof sills; windows and doors on exposed sides protected by approved tin-covered doors and shutters; walls of flues not less than eight inches in thickness, lined with firebrick,

well-burned clay or cast-iron, and throat capacity 8″ x 12″, or 96 square inches; all floor beams to be trimmed at least four inches from the outside of flue; heated by steam; lighted by gas; cornices of incombustible material; roof of metal or tile, and fire-stops in all partitions and in furred walls, if any, at each floor."

In the case of iron beams, not fireproofed, allowance must be made at each end for expansion.

The law of the City of New York requires that "all iron beams, girders, lintels or columns, before the same are used in any building, shall have the maximum weight which they will safely sustain stamped, cast or properly marked in a conspicuous place thereon by the founder or manufacturer of same."

Skylights and glass windows on exposed sides which cannot be protected with metal may well be constructed of wire glass, which is an admirable resistant of fire and almost equal to fireproof shutters.

Brick hot air furnaces. The following are the requirements of the Building Law of the City of New York, and also of the New York Board of Fire Underwriters as to Furnaces:

HEATING FURNACES AND BOILERS.

"A brick-set boiler shall not be placed on any wood or combustible floor or beams.

"Wood or combustible floors and beams under and not less than three feet in front and one foot on the sides of all portable boilers shall be protected by a suitable brick foundation of not less than two courses of brick well laid in mortar on sheet iron; the said sheet iron shall extend at least twenty-four inches outside of the foundation at the sides and front. Bearing lines of bricks, laid on the flat, with air spaces between them, shall be placed on the foundation to support a cast iron ash pan of suitable thickness, on which the base of the boiler shall be placed, and shall have a flange, turned up in the front and on the sides, four inches high, said pan shall be in width not less than the base of the boiler and shall extend at least two feet in front of it. If a boiler is supported on a cast iron base with a bottom of the required thickness for an ash pan, and is placed on bearing lines of brick in the same manner as specified for an ash pan, then an ash pan shall be placed in front of the said base and shall not be required to extend under it.

"All lath and plaster and wood ceilings and beams over and to a distance of not less than four feet in front of all boilers shall be shielded with metal.* The

*The sheathing should not touch the wood but must have an air space of at least ½ inch. It is easy to nail the tin leaving such a space.

distance from the top of the boiler to said shield shall be not less than twelve inches.

"No combustible partition shall be within four feet of the sides and back or within six feet of the front of any boiler, unless said partition shall be covered with metal to the height of at least three feet above the floor, and shall extend from the end or back of the boiler to at least five feet in front of it; then the distance shall be not less than two feet from the sides and five feet from the front of the boiler.

"All brick hot-air furnaces shall have two covers, with an air space of at least four inches between them; the inner cover of the hot-air chamber shall be either a brick arch or two courses of brick laid on galvanized iron or tin, supported on iron bars; the outside cover, which is the top of the furnace, shall be made of brick or metal supported on iron bars, and so constructed as to be perfectly tight, and shall be not less than four inches below any combustible ceiling or floor beams.

"The walls of the furnace shall be built hollow in the following manner: One inner and one outer wall, each four inches in thickness, properly bonded together with an air space of not less than three inches between them.

"Furnaces must be built at least four inches from all woodwork.

"The cold air boxes of all hot air furnaces shall be made of metal, brick or other incombustible material, for a distance of at least ten feet from the furnace.

In this matter the law does not go far enough; I endeavored to have it changed, but was unsuccessful. The entire cold air box should be of metal; it costs but little more than a wooden box; galvanized iron with soldered joints is the best. Not only is this advisable on account of the danger from fire, but also to insure that the poisonous air of the cellar, from wet coal, decaying vegetables, etc., is not pumped through the living-rooms of the house, as it will be if a wooden cold air box is used. Wood as it shrinks with seasoning, changes of temperature, etc., opens seams or cracks.

"All portable hot air furnaces shall be placed at least two feet from any wood or combustible partition or ceiling, unless the partitions and ceilings are properly protected by a metal shield, when the distance shall be not less than one foot.

"Wood floors under all portable furnaces shall be protected by two courses of brickwork well laid in mortar on sheet iron. Said brickwork shall extend at least two feet beyond the furnace in front of the ash pan."

Smoke-Pipes. No smoke-pipe for a furnace should pass unprotected through the floors of a building, but should enter a good brick flue at least 12 inches from any woodwork. The underside of any beams or woodwork above the smoke-pipe

should be protected with sheet tin; and where tin is used in this way as a guard it *should never be in close contact with the wood*, as tin is a good conductor of heat, but should be so fastened as to leave an air space between it and the wood. Bright tin is better than sheet iron, as it reflects the heat. Where any metal shield is in close contact with woodwork it serves only to conceal charring, without preventing it.—an important point to be remembered—so important that I trust I shall be justified in frequently referring to it under different subjects to which it is pertinent.

REGISTERS.

"Registers located over a brick furnace shall be supported by a brick shaft built up from the cover of the hot-air chamber; said shaft shall be lined with a metal pipe, and all wood beams shall be trimmed away not less than four inches from it.

"Where a register is placed on any woodwork in connection with a metal pipe or duct, the end of the said pipe or duct shall be flanged over on the woodwork under it

"All registers for hot-air furnaces placed in any woodwork or combustible floors shall have stone or iron borders firmly set in plaster of paris or gauged mortar.

"All register boxes shall be made of tin plate or galvanized iron with a flange on the top to fit the groove in the frame, the register to rest upon the same; there shall be an open space of two inches on all sides of the register box, extending from the under side of the border to and through the ceiling below. The said opening shall be fitted with a tight tin or galvanized iron casing, the upper end of which shall be turned under the frame.

"When a register box is placed in the floor over a portable furnace, the open space on all sides of the register box shall be not less than three inches.

"When only one register is connected with a furnace said register shall have no valve."

HOT AIR PIPES OR FLUES. Probably the best method of carrying metal hot air flues or pipes through stud and plaster partitions from floor to floor, in buildings where they cannot be carried up in brick walls, is to have the pipe double, with an air space between the inner and outer pipe of at least half an inch, and then to pour gauged mortar (as already explained, this is mortar mixed with plaster of Paris) around the pipe, so as to fill up the space between the wooden lath and the wooden studs and the pipe itself. It is customary to tin the studs, and the advantage of this protection is largely lost if the tin is nailed

tightly to the stud instead of leaving an air space behind it. Where the tin is nailed to the stud without any air space, and the hot air flue touches it, the only advantage gained is in a greater thickness of tin. Where the tin pipe is not double, and where gauged mortar cannot be used, it can be made more safe by wrapping it with asbestos board.

The following is the New York law as to hot air pipes.

HOT AIR PIPES IN STUD PARTITIONS.

"Woodwork near hot-air pipes shall be guarded in the following manner: A hot air pipe shall be placed inside another pipe, one inch larger in diameter or a metal shield shall be placed not less than one-half inch from the hot air pipe; the outside pipe or the metal shield shall remain one-and-a-half inches away from the woodwork and the latter must be tin lined, or in lieu of the above protection, four inches of brickwork may be placed between the hot air pipe and the woodwork. This shall not prevent the placing of metal lath and plaster directly on the face of hot air pipes or the placing of woodwork on such metal lath or plaster, provided the distance is not less than seven-eights of an inch.

"No vertical hot air pipe shall be placed in a stud partition, or in a wood in closure, unless it be at least eight feet distant in a horizontal direction from the furnace.

HOT AIR PIPES IN CLOSETS.

"Hot air pipes in closets shall be double, with a space of one inch between them.

HORIZONTAL HOT AIR PIPES.

"Horizontal hot air pipes shall be placed six inches below the floor beams or ceiling; if the floor beams or ceiling are plastered and protected by a metal shield, then the distance shall be not less than three inches."

RANGES AND STOVES.

"Where a kitchen range is placed from twelve to six inches from a wood stud partition, the said partition shall be shielded with metal from the floor to the height of not less than three feet higher than the range; if the range is within six inches of the partition, then the studs shall be cut away and framed three feet higher and one foot wider than the range, and filled in to the face of the said stud partition with brick or fireproof blocks, and plastered thereon.

"All ranges on wood or combustible floors and beams that are not supported on legs and have ash pans three inches or more above their base, shall be set on suitable brick foundations, consisting of not less than two courses of brick well laid in mortar on sheet iron, except small ranges such as are used in apartment houses, that have ash pans three inches or more above their base, which shall be placed on at least one course of brickwork on sheet iron or cement.

"No range shall be placed against a furred wall.

"All lath and plaster or wood ceilings over all large ranges and ranges in hotels and restaurants, shall be guarded by metal hoods placed at least nine inches below the ceiling.

"A ventilating pipe connected with a hood over a range shall be at least nine inches from all lath and plaster or woodwork, and shielded. If the pipe is less than nine inches from lath and plaster and woodwork, then the pipe shall be covered with one inch of asbestos plaster on wire mesh.

"No ventilating pipe connected with a hood over a range shall pass through any floor.

"Laundry stoves on wood or combustible floors shall have a course of bricks, laid on metal, on the floor under and extended twenty-four inches on all sides of them.

"All stoves for heating purposes shall be properly supported on iron legs resting on the floor three feet from all lath and plaster or woodwork; if the lath and plaster or woodwork is properly protected by a metal shield, then the distance shall be not less than eighteen inches.

"A metal shield shall be placed under and twelve inches in front of the ash pan of all stoves that are placed on wood floors.

"All low gas stoves shall be placed on iron stands, or the burners shall be at least six inches above the base of the stoves, and metal guard plates placed four inches below the burners, and all woodwork under them shall be covered with metal."

HONEST BUILDERS AND CONTRACTORS.

While there are numerous "jerry-builders" engaged in erecting buildings to be sold to ignorant purchasers, there are commendable exceptions, who do good work even in the absence of building laws and their honesty generally proves to be the best policy.

CONSTRUCTION OF FRAME BUILDINGS.

It is doubtful if there is any subject of which greater misconceptions exist, on the part of property-owners, than this of the fire-resisting qualities of frame buildings. As usually constructed, they are, of course, quickly destroyed; but if built properly, with the spaces between studs filled in with brick or other fire-resisting material, with all drafts cut off, with substantial timber for posts, and beams, and with wire lathing, buildings may be constructed of frame so that they will actually resist fire longer than improperly constructed brick buildings. In fact, a large proportion of brick buildings are really wooden structures of the most flimsy character surrounded by enclosing

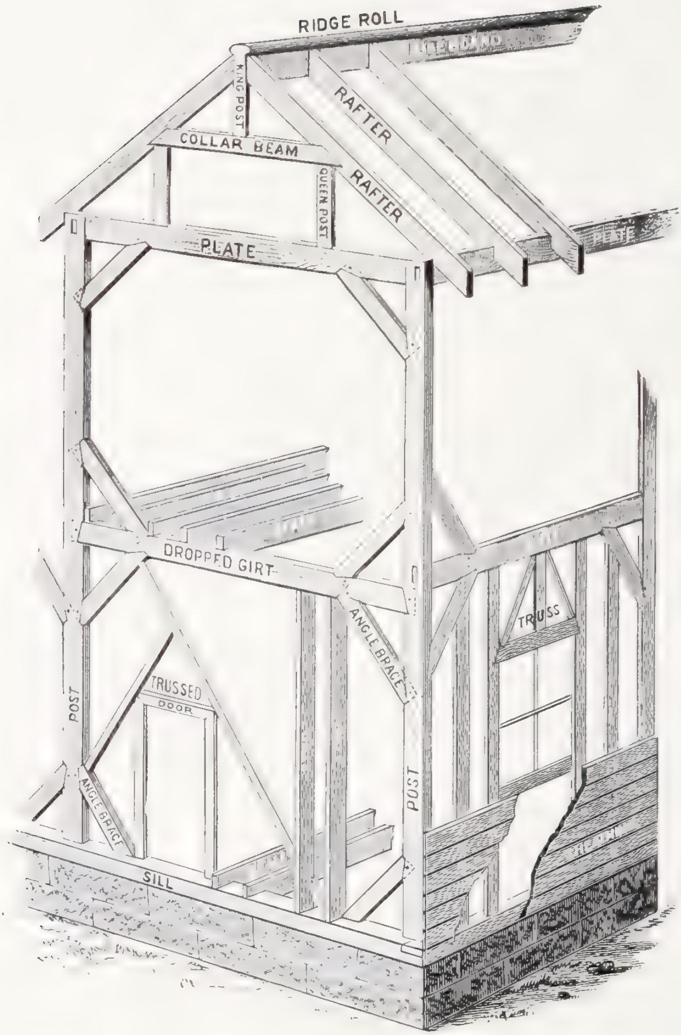
walls of brick which, while affording a greater resistance to outside fires than frame enclosing walls, do not, in any way, retard the destruction of their own contents and framework in case fire is once started inside the structure. In frame buildings, as in brick buildings, the great secret of safety is to avoid concealed spaces, especially in partitions, which form upright flues to increase drafts.

In isolated locations, as in the case of country houses, a frame dwelling house with a metal or slate roof, offering resistance to chimney sparks, with well constructed flues, might be a better risk than a brick dwelling house with a shingle roof.

An underwriter should thoroughly understand the proper construction of buildings, both for the purpose of inspecting them and of determining their value for purposes of insurance, and for adjusting losses.

The illustration page 102, will show the names of the various timbers—braces, girts, rafters, &c.—and enable any one, with a little study, to understand so-called "Balloon Frame" and "Braced Frame" construction. In the braced frame the "girts" or beams for carrying the floor beams of the floors above the first are framed into the corner posts, which should extend to the wall plate, those supporting the ends of beams being dropped to secure a level with the side girts (for this reason called "drop girts".) On these girts the studs of the outer walls or partitions are framed, so that each story has a separate set of studs. At all angles, also, there are "angle-braces" tending to strengthen the structure. Joints are secured usually by wooden pins. When a house is to be erected, the first story beams should be sized and leveled upon the sill and upon the foundation wall, and their tops made level. They should be well spiked to the sill. The beams of the upper floors should be notched down on the girts and sized upon the partition caps, spiked strongly to form ties across the building. All the sills, girts and posts should be securely framed into each other, mortised and fastened with hard wood pins or "treenails" and angle-braces.

Balloon Frame. In the balloon frame the studs as well as the corner posts are carried from the sill (*i. e.*, the flat timber which lies along the top of the foundation wall) continuously to the wall plate (usually called the "plate") at the top of the wall,



BRACED FRAME SHOWING NAMES OF TIMBERS, SHEATHING, TRUSSED WINDOW, ETC.

and the floor beams of the second and third stories are carried by 2″ x 6″ pieces called "ribbons" spiked securely to the studs. These ribbons should be let into the posts and studs so as to rest upon the shoulder formed and not depend alone upon the nails or wooden pins.

The balloon frame costs somewhat less than the braced frame, but if well braced with long struts and interties, is strong enough for all practical purposes. Indeed, many builders regard a balloon frame structure as stronger than the braced frame, and better calculated to resist tornadoes or severe wind stresses.

In both the balloon and braced frame the outer or enclosing studding is sheathed with sheathing boards for the reception of the shingles or clapboards (whichever be used), and if this sheathing is put on properly it is an additional element of strength. In the case of the balloon frame, the vertical or upright timbers, as already stated, are in single, unbroken lengths from the sill to the wall plate. If it is necessary to splice two of these joists together the splicing should be done by "fish-plates" so called, or splices of inch board, three feet in length, nailed, like splints for a broken limb, securely on both sides of the splice. If the bearing is true and square a spliced stud is strong enough, but there should not be more than two or three of these in any side wall or partition.

Where it is necessary for any partition to foot or rest upon a tier of floor beams it should pass between the beams and rest upon a "sole", or strip of yellow pine, not less than one inch thick, of the full width of the studs, the studs of upper floors being so arranged that each will come directly over the lower stud. There should be as little horizontal timber between the uprights of a structure as possible, as timber shrinks horizontally, and not vertically.

Each tier of floor beams should be cross-bridged at intervals of five to seven feet in the length, as already explained page 86. The cross-bridging should be cut on a bevel so as to make a secure brace, as shown in the illustration.

As already explained, careless builders sometimes simply nail short boards between beams, which do not act as braces and only add to the weight.

An important point to be regarded in all structures, even from

the underwriter's point of view, (already referred to in Brick joisted construction and properly referred to here) is to have the shrinkable timber balanced; that is, as much in one of two parallel walls as in the other, so that as the building settles, when the wood shrinks, it will settle evenly. Wherever this rule is not observed, or wherever one wall is of brick or stone and the other of wood, there will be uneven settling, tending to make chimneys dangerous, especially those which rest on floor beams or those incorporated with the wooden framework, as where beams or joists are fastened into the brickwork of the chimney.

The names of the various members of a structure may be found by reference to the diagram page 102. A truss is a mechanical contrivance like that shown over the window and has enough weight carrying capacity to relieve the strain on the frame. The construction shown by the king post, collar beam and queen post in the roof, repeated with every rafter, or with alternate rafters, tends greatly to strengthen a roof, and at very slight expense. In the illustration it will be seen that the effect is a truss roof, and it may be secured by simply nailing cheap spruce strips, cut out of two-inch plank, four inches wide, to the rafters, resting on queen posts running to the plate and to the ceiling beams of the floor below. Such a roof would resist more than an ordinary weight of snow and, in the case of an average building, would not cost more than twenty or twenty-five dollars. The owner of any building would probably appreciate the suggestion made to him in time, for it is a cheap precaution frequently overlooked by builders and architects.

That portion of the wall above the surface of the ground, between the foundation and the building is usually called the "underpinning."

Rafters. Main rafters should not be less than 2″ x 8″, set 16″ on centres. If they are unsupported for a greater span than 18 feet they should be larger.

"Plates" in an ordinary dwelling should be not less than 4″ x 6″; "posts" not less than 4″ x 8″; sills not less than 4″ x 8″; attic ceiling joists not less than 3″ x 8″; braces not less than 4″ x 6″; floor joists or beams not less than 3″ x 10″—better 3″ x 12″.

Roof. An ordinary shingle roof is liable to leak in every rain

following a drouth, owing to the shrinkage of the shingles and until they swell with the moisture. An inexpensive precaution which would protect the plastering and the paper of the house from annoying leaks is that of fastening heavy water-proof, tarred building paper under the rafters for the full size of the roof, commencing at the peak and lapping each successive sheet of paper three inches over the lower edge of the one above it, providing for any leak of the shingles above to run off at the eaves outside of the building and clear of the plate. In expensive buildings, sheets of copper might well be used. Zinc would be less expensive, but would not last so long as the copper; but probably a heavy quality of good, sized building paper would answer every purpose. Such a roof would be cooler in summer and warmer in winter.

(NOTE. For full specifications for the construction of a building, woodwork, masonwork, plumbing, etc., etc., see index.)

FIREPROOF CONSTRUCTION.

It is probable that few subjects connected with construction are more generally misunderstood than this of fireproof building. The average individual regards iron and stone as fireproof. He, at the same time, overlooks the fact, strangely enough, that glass windows are not fire-resisting. Even underwriters, in estimating rates on fireproof buildings and their contents, often overlook the fact that a building intended to be fireproof, but offering nothing more substantial as a fire shield against an outside fire than ordinary plate glass in a wooden sash and frame, is even more likely to have its contents thoroughly destroyed by an exposure fire than an ordinary building of wooden joisted construction; for the fireproof structure, as already stated, holds its merchandise and other contents suspended where they will be the more effectually destroyed. The wooden joisted building, on the other hand, would probably collapse, and no small salvage might be realized out of heaps of merchandise in the cellar so covered up that combustion would be retarded for want of air, on the same principle that a pile of wood shavings is seldom invaded by fire to a greater depth than ten or twelve inches.

A further reason why the contents of fireproof buildings are so thoroughly destroyed when once ignited is that the fireproof construction, like a reverberating furnace or oven, confines the heat until extremely high temperatures are reached. Indeed, firemen who have had experience in fighting fires in fireproof buildings claim that it is almost impossible to remain on a floor where merchandise is on fire, so intense is the combustion; everything ignitible is shriveled up. The principal advantage, therefore, after all, of a fireproof building is the separation of the various stories from each other; and this may be largely, if not entirely, lost if the building has well-holes, like the Horne building, or if staircases and elevators are not cut off in fireproof

hallways. Architects usually overlook the fact that stone is one of the most dangerous materials, as already explained, when attacked alternately by fire and water, and that iron may so expand under heat as to thrust out the side walls of a building; if, indeed, iron columns do not collapse under their weakened capacity to resist strains due to high temperatures. It is a fact that wooden columns, especially of oak, twelve inches square, would stand an enormously high temperature without having their carrying capacity interfered with, fire burning only to the depth of say two inches.

Indeed, it is important that iron should be protected by fireproof material wherever used, and that stone should not be used in vital portions of the structure, especially in treads for staircases, as it would yield early in the fire. Such treads, whether of marble or slate, should be supported by iron webs, of sufficient strength and endurance to form a footing in case the stone yields. This is a precaution almost universally overlooked, as already explained.

The accompanying illustration of the Post & McCord Machine-Shop, in Brooklyn, in 1900, constructed of angle-iron, with curtain walls of terra cotta tile, shows how dangerous may be a construction intended to be fireproof, but consisting only of thin incombustible curtain walls and unprotected ironwork. The underwriter should never lose sight of the fact, to which I have so frequently called attention in these pages, that iron, owing to its tendency to expand when heated, is one of the most dangerous materials that can be used in a building, unless guarded against direct contact with fire.

Cast-iron, on the other hand, as heretofore explained, is not liable to rust to the danger point, and for this reason is preferable for story posts or pillars when covered up where it cannot be examined. Indeed, cast-iron is better than wrought-iron or steel for resisting fire, not withstanding that its fusing point is lower than that of wrought iron or steel.

An ideal fireproof building would be one consisting of substantial walls of brick, well burned brick being a better fire resistant than any other material; with all ironwork protected by fireproof material; with all floors properly cut off from each other; the staircases and elevators in hallways; and all passages

"FIREPROOF" MACHINE SHOP OF POST & Mc CORD, BROOKLYN, N. Y.

BURNED APRIL 8, 1900.

SHOWING EFFECT OF FIRE ON UNPROTECTED IRON AND THIN TILE WALLS.

from one floor to another, whether in the shape of channels for plumbing, gas or other pipes, electric wiring, or shafts for dumb-waiters, so cut off at each story that a fire could not go from one story to another; the floors themselves being fireproof, without floor boards, the surface being of concrete or asphalt, and inclined, with scuppers through the side walls so arranged as to drain off any water which might be thrown by a fire department, and protect the floors or merchandise beneath the one on fire.

The construction of a fireproof building of the modern style involves knowledge of engineering as well as of architecture, but I have touched upon the more important points to be kept in mind by an underwriter, for purposes of insurance.

The roof should be fireproof, with flat, well burned tile laid in cement, with copper for flashings, gutters and leaders. Slate roofs are objectionable, especially on high buildings. Roofs should be inclined from the street front back, to prevent dripping of water and formation of icicles dangerous to pedestrains on the street below.

A fireproof building should be provided with a standpipe six inches in diameter, with Siamese connection at the street and outlets for hose on each floor; the couplings to be of the same size and number of threads to the inch of the fire department of the town or city in which the building is located. This saves the carrying of more than a single length of hose up the stairs—a difficult matter in the case of a high building. A 50-foot section of ordinary $2\frac{1}{2}$ inch hose, with couplings, weighs 60 pounds, and it is a heavy load for a man who has to climb a steep stairway.

There should be at all times—nights and holidays—a watchman in every high building understanding the machinery of elevators, fire appliances, &c., and steam should always be kept up on holidays and at night, so that the firemen can carry hose up to the upper floors, to save the delay if stairs have to be climbed.

All the interior partitions of a fireproof building should be of fireproof material, either of brick or of terra cotta. They should be constructed of 4-inch angle and tee-iron frame, the uprights spaced 30 inches apart, filled in between with 4-inch terra-cotta blocks and plastered on both sides. They should pass through

the wooden floor boards and rest directly on the concrete beneath the floor boards. As already stated, however, wooden floors are objectionable and should be prohibited, especially at greater heights than one hundred feet above the grade.

Iron tie-rods should be employed between the iron floor beams, to secure rigidity. They are especially necessary during construction and when derricks are used on beams to hoist materials.

The best material for fireproof arches between the floor beams, as already stated, is old-fashioned brick in a bonded arch. Next to this in safety stands the porous terra cotta, with end construction, *i. e.*, the blocks or separate pieces placed end to end, instead of side to side in what is known as "side construction." There are many admirable patent floors, however, made of concrete with Portland cement in the usual manner, already explained; but it is, of course, vitally important that this concrete should be properly mixed, of good materials and *laid in non-freezing weather.*

Well-Holes. These should be avoided, if the building is to be regarded as fireproof. The Horne Building, in Pittsburg, had one 48′ x 22′. It is almost impossible to control a fire starting in the lower floors, where a well-hole opens through those above.

As I write (April 11, 1900) the news comes of the second burning of the Horne Building, with a loss of 90% of the value of the stock contained in it, illustrating, a second time, the point already emphasized that stocks in fireproof buildings are even more liable to be totally destroyed than in ordinary non-fireproof buildings, unless the stories are cut off.

Wire Glass. Where shutters cannot be provided for want of opening room, as already stated, wire glass is an excellent fire resistant; but the tests so far made of it do not warrant the opinion that larger panes than three feet square can be relied upon. The smaller the pane the more reliable the glass as a fire resistant. This is true, also, of ordinary plate glass, which in small sections or panes will stand quite high temperatures before yielding. Small panes of plate glass, about three inches square, securely set in metal frames, will stand a high temperature, and in most cases would prove a sufficient barrier against a severe fire. Even after water is thrown upon it, it cracks but does not fall out.

Boiler Room. See index.

Dynamo Room. See page 93.

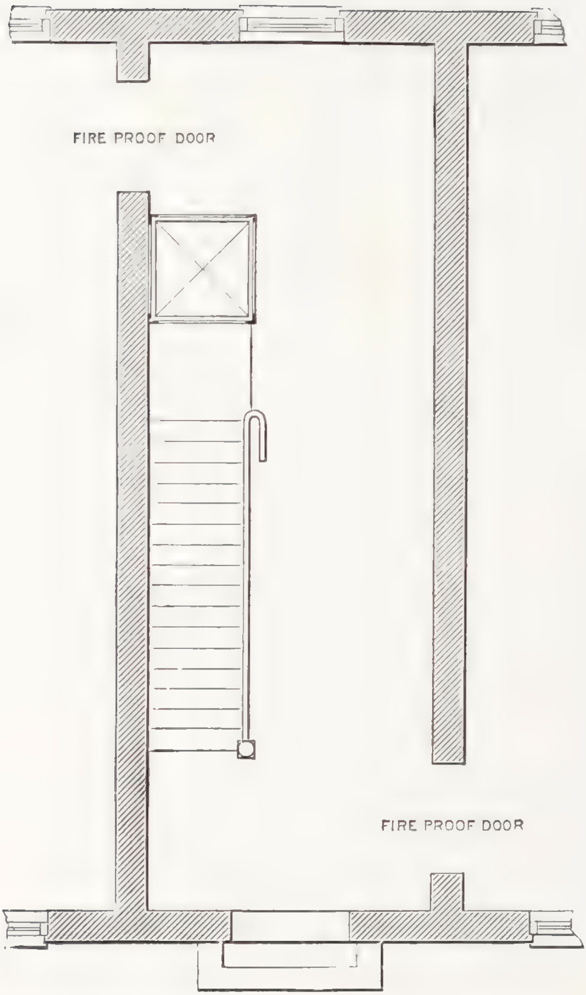
Communications Between Adjoining Buildings. It is sometimes necessary to have communications between adjoining buildings by doors in the fire walls, and it is not always convenient, when transferring merchandise from one room to another during working hours, to have closed fireproof doors. It is, however, possible to have the fireproof doors run upon trolleys on an inclined track so as to close automatically by the force of gravity if held open by fusible metal latches or links which would release them when melted by the rising temperature of a fire. It has occurred to me that this difficulty may, also, be met by erecting between two adjoining buildings a separating fireproof hallway of brick, which can be utilized for staircases and elevators and for supporting the water tanks of automatic sprinklers. The doors which open into this hallway *should not be opposite each other*, but arranged, one at each end, so that fire in either of the buildings passing through the door would meet a blank wall opposite. Even if the fireproof doors to these openings should happen to be open at the time of a fire in one of the two buildings, it is improbable that it would gain access to the other.

The floors of this hallway should be both fire and water-proof, slightly lower than the main floor of the two separated buildings, and with water vents or "scuppers" for carrying off water thrown by a fire department. Indeed, it is well to have "scuppers" to all the floors of a building.

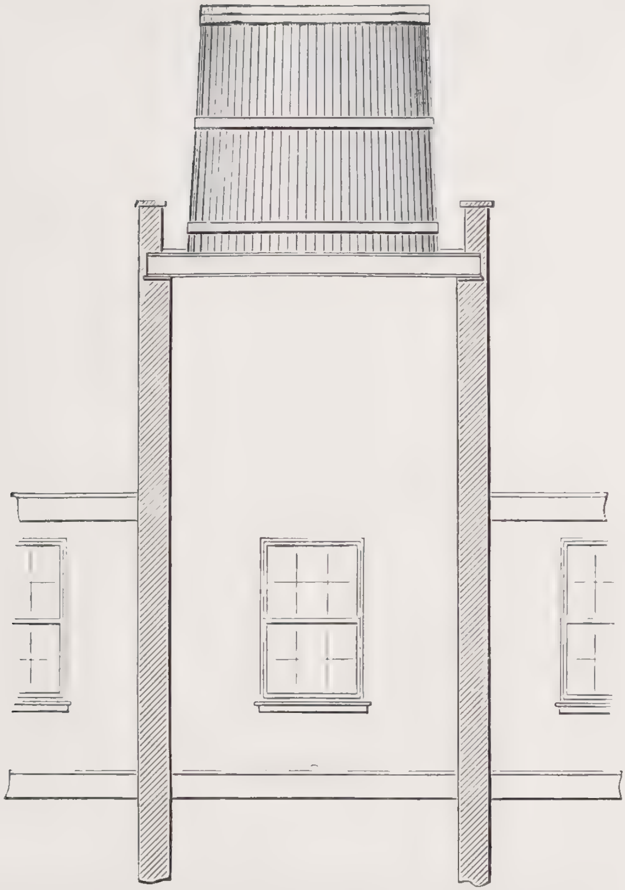
The walls of this separating hallway or vestibule should rise four feet higher than the roofs of the two buildings and, if there are window or door openings near it, its walls should project beyond the line of enclosing walls at least one foot.

It ought to be unnecessary to state that to insure safety there should be no combustible material whatever allowed in this separating hallway, and that the staircase, elevators, etc., should be of metal and fireproof.

Separation of Wooden Buildings. Indeed, such a hallway as this could be relied upon to separate wooden buildings. It should, however, for that purpose, be at least ten feet higher than the peak of their roofs and should extend four feet beyond their front and rear lines.



SEPARATING FIRE-STOP HALLWAY, GROUND PLAN
Scale $\frac{1}{8}$ inch to foot.



SEPARATING FIRE-STOP HALLWAY—ELEVATION OF UPPER STORY AND ROOF WITH WATER TANK.
Scale $\frac{1}{8}$ inch to foot.

The accompanying diagrams fully illustrate the idea.

Outside Staircases. Where it is not necessary to transfer merchandise from one building to another, but only requisite to have a passageway for employees, this may be arranged by an iron balcony, like a fire escape, the window being cut down on each side of the separating wall for a door, so that communication can be had by the balcony. The openings should have fireproof doors. This would be practically safe. It might, with iron ladders, be utilized as a fire escape, and so prove of great advantage to firemen in fighting a fire, who could hold a hose nozzle at the different windows with perfect safety to the last moment. It is practicable, indeed, to have iron stairways with roofed balconies entirely outside of storage stores so that the floors do not communicate. There is a number of these in Philadelphia.

The following recapitulation of important features in a fireproof building will be of use:

RECAPITULATION.

In order to save anyone who contemplates erecting a fireproof building the trouble of revising the preceding pages, I have prepared the following recapitulation of important points to be observed, so that he can check off his plans and specifications and see that all important features have been duly attended to.

Enclosing Walls. Should be not less than 16 inches thick for the top story, increasing four inches in thickness for every 25 feet to the bottom. Should be built of hard-burned brick, the lower stories (if not all) laid in cement mortar.

All weight carrying walls should be separated by air spaces from furnace walls.

All templates should be of cast-iron, especially for beams which support tanks. Stone templates should not be used.

Iron Members. All ironwork should be fireproofed, *i. e.*, protected by not less than 4 inches of fireproof material. Brick is best, well-burned terra cotta second, plaster on metallic lathing third. If plaster on metal lath be relied on, first wrap the column with asbestos quarter inch thick, bound with wire. If mercantile or manufacturing building, protect the fireproofing material of the lower four feet of columns with a metal lagging

cover, to prevent its being knocked off by roller trucks for moving merchandise. Heavy hardwood cleats may secure this but if employed there must be the plaster protection next the iron column and behind the lagging.

Columns should be cast-iron, the beam bearing corbel brackets being cast in one piece with the column. Columns should be cylindrical (not square) to secure more perfect castings. See that top and bottom bearings are planed smooth and true; no wedges or "shims" allowed.

Allow for expansion in long systems of beams or girders. Avoid steel rivets; all rivet-work dangerous on account of rust. Beams should be bolted to lugs on cast-iron columns.

All ironwork should be well painted with good linseed oil paint, the iron being first thoroughly cleaned. Avoid turpentine, dryers, &c. *Do not run steam or water pipes near columns to cause rust. This very important.* See that fireproofing is applied so that columns may be stripped and examined from time to time.

Beams should not be spaced wider apart than five feet on centres.

Bond Stones. Avoid in piers.

Stone Columns. Avoid.

Tie Rods. Do not omit them.

Floor Arches. Best, old-fashioned brick arch; next best, terra cotta segmental arches, end construction. If concrete arches used, be careful to see that good quality of cement is employed and the stone or gravel thoroughly washed. Arches should not be laid in freezing weather. Only cement mortar should be used and every square foot carefully watched in process.

Cover top of arch with cement concrete to insure water-proof floors. Leave scuppers or water vents at each floor to carry off water thrown by fire department.

Do not leave hollow spaces below wooden floor boards.

Stairways, Elevators, Dumbwaiters, Etc. Should be cut off in all buildings by a brick partition between the hallways and main rooms, with fireproof doors (for which see Underwriters' specifications.) It is best to have all stairways enclosed in brick walls.

Avoid stone treads, slate or marble, unless web support of

iron beneath. It is claimed wrought-iron support is better than cast-iron open work unless cast-iron tread is $\frac{3}{4}$ inch thick.

Thoroughly fire stop all openings for gas, steam pipes or electric wires, to prevent fire traveling from story to story. These should be in staircase tower.

Glass Windows. If on exposed sides protect with fireproof shutters, Underwriters' specifications. Set eyebolts for hinges when building walls. If wire glass be used, it should be glazed in metal frames, and if on exposed side, should have double sheets with one inch space between them.

Dynamo Room. Avoid water or steam pipes over switchboard. Have glass floor.

Fire Extinguishing Appliances. Have 6-inch standpipes with outlets for hose at each story for use of firemen, Siamese connection at street. Arrange signals to street and hose on each floor to reach most remote point.

Have pressure tanks in basement and support all roof tanks on iron beams (fireproof) resting on cast-iron templates on brick walls where they cannot in falling endanger staircases.

Vertical pipes for hose should be in staircase tower.

Roof. Avoid all woodwork in roof, even outriggers for cornice. Avoid slates on slanting roofs, as in falling they would injure firemen. Best roof is flat brick or tile.

Partitions must not rest on wooden sills or bases or floor boards.

Night Watchman. Have some one on premises at night and on holidays understanding elevator, force pumps, etc. Have enough steam up, at all times, to run one elevator.

Skylights. Protect with wire netting above and below and arrange so as to be opened by firemen for letting out smoke and gas. If wire glass is used then no overnetting or undernetting will be required.

Cut-offs at Street for Gas and Electric installations should be provided where firemen can find and use them in case of fire. This is an important matter.

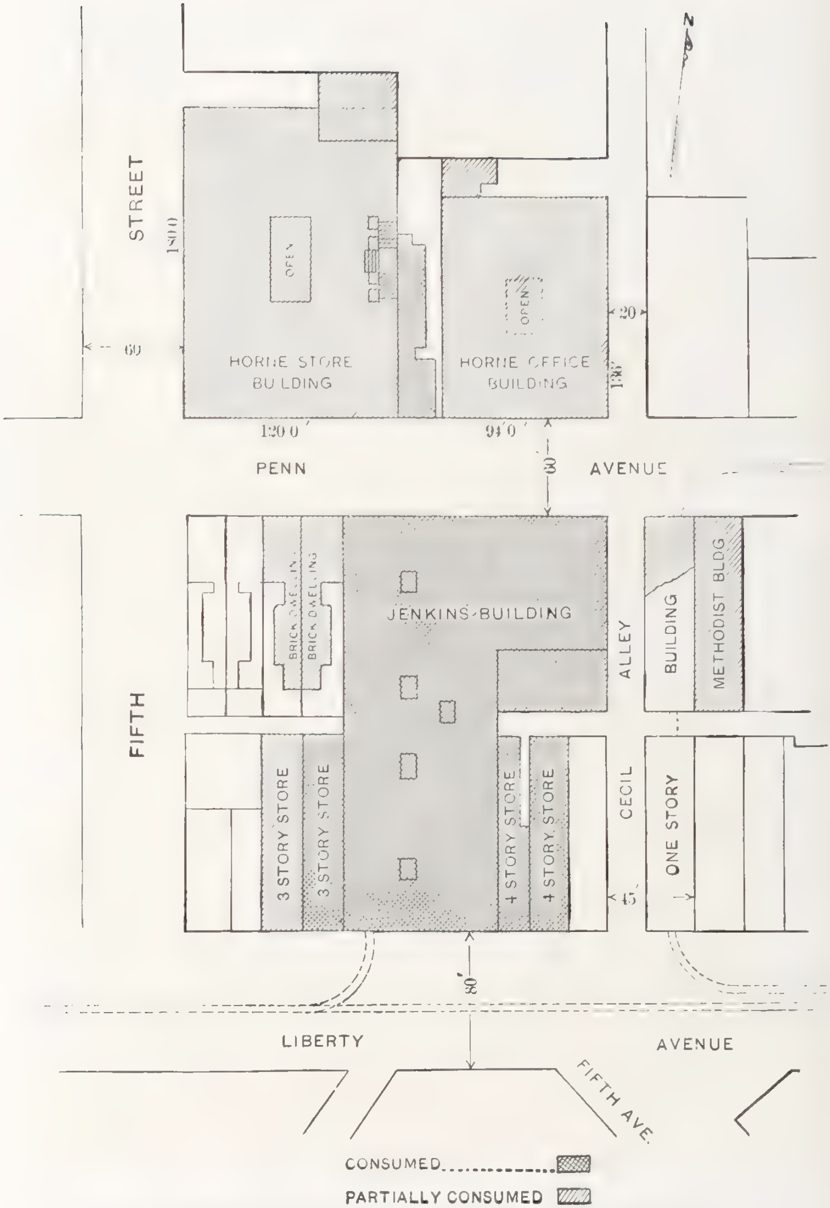
Pump-Room. It will be found that owners of fireproof buildings, and some underwriters, overlook the fact that the volume of water thrown to extinguish a fire is usually sufficient to flood the engine and pump room, put out the fires, expel the engineer

and stop the elevators. If possible the pump and engine room should be so cut off from the rest of the building that it would not be flooded, no matter how much water should be thrown to extinguish the fire. This is not always easy nor possible, and where it is not, too much reliance should not be placed upon the independent pump system of the plant. Of course, the outlet to the sewer and the sewer itself on a lower grade should be of sufficient capacity to carry off the water thrown by the fire department—probably as much as 4,000 gallons per minute, if say ten steam fire engines were working.

The staircases and elevators of a fireproof building should be enclosed in four brick walls, with fireproof doors protecting the communications with the main structure. Protect outside windows lest burning neighboring buildings should project enough heat into the window openings to prevent the egress of inmates or the ingress of the firemen. Wire glass would be desirable for such windows.

Avoid Well-Holes. The Horne Building, in Pittsburg, which was seriously damaged and its contents destroyed on May 3, 1897, the loss on the building by this fire being $300,000, and on the merchandise $741,250, illustrates the danger of well-hole openings and the danger of opposing nothing more than plate glass windows to exposure fires (It was burned the first time by the Jenkins Grocery Building shown on diagram page 118), and also justifies the statement I have made that combustible contents of fireproof buildings will burn up as effectually as the fuel in a stove.

The relative damage to the contents and building was again illustrated in the second fire, April 8, 1900; the loss on building being $153,019.13 (32% of the value), and the loss on stock $697,030.13 (74% of the value). If there had been no well-hole and the floors had been cut off the loss would probably have been confined to the floor of origin.



HORNE BUILDING (FIREPROOF) AND SURROUNDINGS, PITTSBURG, PA.
GROUND PLAN.

(Published by consent of THE ENGINEERING RECORD.)

HORNE MERCANTILE AND OFFICE BUILDINGS—PITTSBURG.

AFTER FIRE, MAY 3, 1897.

LOSS ON MERCANTILE BUILDING $300,000. CONTINENTAL PAID $16,533.

LOSS ON STOCK CONTAINED THEREIN $741 250 LOSS ON OFFICE BUILDING $200,063.

HORNE BUILDING, PITTSBURG. INTERIOR.

HOME LIFE "FIREPROOF" BUILDING, NEW YORK.
FIRE DECEMBER 4, 1898.
SHOWING BUILDING BEFORE THE FIRE.

HOME LIFE "FIREPROOF" BUILDING, NEW YORK.

FIRE DECEMBER 4, 1898.

SHOWING BUILDING AFTER THE FIRE.

MANHATTAN SAVINGS BANK BUILDING.

FIRE NOV. 4, 1885.

LOSS $225,000. CONTINENTAL INS CO., PAID $20,355.

SLOW-BURNING STORE CONSTRUCTION.

The chief aim of the architect, from a fire-resisting standpoint, should be, first, to avoid conditions which would favor the starting of fires, and, second, to observe precautions which would prevent their spread and facilitate their extinguishment.

The use of wood for beams, girders and supporting columns is not so objectionable from the fire standpoint as is generally supposed, if they are of sufficient size to carry their loads after their surface has been invaded by fire to the extent of say two inches. Fire seldom gets deeper into a solid 12 inch column or beam, with a good fire department. In slow-burning construction or mill construction, so called, all wooden beams, girders and pillars should be not less than 12 inches thick, and the floor plank should be not less than three inches in thickness, tongued and grooved, or connected by splines, with a floor board one inch thick and planed. Sheet iron or tin, painted on both sides with a good oil paint, inserted between the two would be an admirable precaution, but would add to the expense beyond the figure which most property-owners would approve.

Taking the building from the foundation to the roof, therefore, in the order in which it is constructed, the following details of construction should be observed to secure the lowest rate of fire insurance:

Foundation. This is largely a question of engineering, but it may be here stated that the most competent experts in engineering, architecture and construction pay great attention now, to securing footings and substantial foundations, driving piles to a solid bearing wherever necessary.

Stairways. Elevators. Dumb-Waiters. channels for pipes, etc., should be cut off at each floor and enclosed with fireproof materials; the stairways and elevators especially being surrounded by brick walls or by fireproof terra cotta, securely braced with angle

iron. Brick walls are decidedly preferable. Doors entering from halls to the various rooms should be self-closing and are improved greatly by being covered with tin.

Floors. These, as already stated, should be solid, without air spaces, with 3-inch plank, splined or tongued and grooved, and inch thick floor boards; waterproof paper, asphalte or resin sized, between. Asbestos is not so good. Tin or sheet iron painted both sides is better.

Story Posts. Beams. Girders, Etc. These should be not less than 12 inches in diameter, if round, or 12 inches square. The floor beams should be cut on a bevel of three inches where they are inserted into the enclosing or bearing walls, so that, in case of burning through in the middle, they would release themselves without tearing out the walls. There are some excellent patent devices for anchoring floor beams, consisting of cast-iron boxes resting in the wall so constructed as to release the floor beam without damage in case it should burn, and serving also to protect the ends of the beams from dry rot and from charring in case of a fire in an adjoining building. Avoid iron stirrups for carrying beams. They are almost certain to yield to heat. I observe that the Boston Manufacturers' Mutual recommend 8-inch columns for upper stories. While these, of course, would be sufficiently strong for weight-carrying purposes, they would not be for fire-resisting purposes, and I would advise 12-inch columns in all cases. Some authorities recommend spliced or doubled timbers separated for ventilation to prevent dry rot. I advise single sticks for fire-resisting purposes. There is no danger of dry rot if the wood is not covered with plaster or other air-excluding covering.

Iron Pintles. Caps and Plates. The story posts or columns of a building should not foot upon wooden beams or girders. In all cases cast-iron pintles, caps and plates should be employed, not merely to distribute the weights for the full bearing surface of the columns, but to prevent sagging resulting from shrinkage of the timber in the girders, which in a four-story building would be considerable, the four 12-inch girders aggregating four feet of shrinkable timber. As heretofore stated, timber shrinks at right angles to the line of its fiber; there is very little shrinkage longitudinally.

The iron base, pintle and cap may be purchased cast in one

piece, and should be bolted to the timber to insure rigid construction.

Flues. These should be surrounded by at least 8 inches of brickwork, and will be improved still further by having fireproof tile linings.

Enclosing Walls. These should be not less than 12 inches thick for the top story, if of brick (16 inches would be better,) and should increase in thickness four inches for each story to the bottom. While the wall here recommended, and the standard of the Universal Mercantile Schedule already quoted, 12 inches thick at the highest point, increasing four inches for each story to the bottom, utilizing the increased thickness at each story as beam-bearing ledges, is unquestionably the only kind that should be erected for fire-resisting purposes, it is customary to build according to the New York Building Law, the requirements of which are as follows:

"The walls of all warehouses, stores, factories and stables, twenty-five feet or less in width between walls—

Shall not be less than twelve inches thick to the height of forty feet.

If over forty feet in height, and not over sixty feet *in* height, the walls shall not be less than sixteen inches thick to the height of forty feet, or to the nearest tier of beams to that height, and from thence not less than twelve inches thick to the top.

If over sixty feet in height, and not over seventy-five feet in height, the walls shall not be less than twenty inches thick to the height of twenty-five feet or to the nearest tier of beams to that height, and from thence not less than sixteen inches thick to the top.

If over seventy-five feet in height, and not over eighty-five feet in height, the walls shall not be less than twenty-four inches thick to the height of twenty feet, or to the nearest tier of beams to that height; thence not less than twenty inches thick to the height of sixty feet, or to the nearest tier of beams to that height, and thence not less than sixteen inches thick to the top.

If over eighty-five feet in height, and not over one hundred feet in height, the walls shall not be less than twenty-eight inches thick to the height of twenty-five feet, or to the nearest tier of beams to that height; thence not less than twenty-four inches thick to the height of fifty feet or to the nearest tier of beams to that height; thence not less than twenty inches thick to the height of seventy-five feet, or to the nearest tier of beams to that height, and thence not less than sixteen inches thick to the top."

In the case of pier construction of enclosing walls with "relieving" or discharging arches and panels to save brick work, the panels need not be thicker than 12 inches, but a thinner panel should never be relied upon, as, although suffi-

cient for weight-carrying purposes, it would not be an effectual barrier against the heat of a fire in an adjoining structure.

No building for the storage of merchandise should be higher than 60 feet from the ground, unless fireproof throughout, and then not over 95 feet, even in cities with good fire departments.

Parapet Walls. The enclosing walls of a building should be carried above the roof (and coped with stone as a protection from the weather), to a height of at least 12 inches, to protect the building from fires in adjoining structures.

Bonds, Caps, Wall Plates, Templates, &c. These should in all cases be, as already stated, of cast-iron. Neither wrought-iron nor stone should be used.

Roof. This should be of metal, without any air space.

Water Tank. This should be supported upon brick walls, so as not to give way and fall, as would be the case if wooden supports were employed and burned through. It may rest upon railroad iron or I-beams carried from wall to wall. Under no circumstances should it rest above the staircase, where in falling it would endanger the lives of firemen.

Electric Wiring. This should be installed in accordance with the rules of the National Board of Fire Underwriters, which may be obtained without charge from any local board of underwriters.

Waterproof Floors. Great damage usually results to stocks of merchandise from the water thrown by fire departments to extinguish fires. The floors should, therefore, be waterproof and should be so inclined to the side or rear walls that the water will run off by means of scuppers or metal pipes inserted in the walls at the floor level, having check valves or movable drop caps which would prevent the ingress of cold air and permit the egress of water. The door-sills should be one inch high.

Closets. There should be no closets, especially for oils, filling lamps or other purposes, under the staircases or elevators, where a fire starting would quickly reach the floors above. In fact, closets are always objectionable in mercantile and manufacturing buildings. They become hiding places for careless employees, for greasy overalls, oily waste or other rubbish often with friction matches. Numerous fires start in such places and

assume dimensions under conditions that make them dangerous. Wherever practicable, concealed places of all kinds should be avoided.

Heating. If by steam pipes, they should, at no point, come in contact with wood, but should be guarded by thimbles where they pass through floors. If by furnace, the hot air pipes should not pass between the floor of one room and the ceiling below, or between stud and lath and plaster partitions. Where it is necessary to have a hot air pipe pass out of sight it should be double, with an inner and outer pipe and a space of half an inch between the two. Steam heating pipes should for safety be near ceilings they heat rooms more evenly.

Dry Rot. It is important to observe precautions to insure against dry rot in buildings with wooden floor joists or wooden columns, especially if they are covered up by plaster to protect them from fire. It is customary to cover them with wire lathing and plaster and, in such cases, small perforations about ¼-inch in diameter through the plaster at the top and bottom of a pillar or column would probably secure sufficient ventilation to save the column, which, also, should be centre-bored. This is true also of floor beams, which may be ventilated at each end with small holes in some ornamental pattern. It is not generally known, however, that unprotected beams, if 12 inches in diameter, as already stated, are rarely consumed to the point of breaking, if the city has even an average fire department.

Wooden Ceiling and Sheathing on Side Walls. This is decidedly dangerous, especially where pine or other resinous wood is used. Fire flashes readily over the entire surface and quickly gets under such headway as to defy the efforts of the fire department. If floor joists and side walls are not to be left exposed, (the plastering, if any, on the side walls without wooden laths, furring, etc., what is known as "open finish,") the old fashioned plaster, even on wooden lathing, is infinitely preferable to wooden sheathing or ceiling. If plaster is used it should always be upon wire lathing. This insures a good key or clinch to the plaster which will retain the plaster when saturated with water longer than wooden laths. It forms an effective fire-stop, also, for a considerable time and materially aids the fire department in extinguishing a fire.

Sky-Lights. These should be of thick glass, with metal frames,

and should be guarded by wire netting above, to protect them from falling fire brands from outside fires, and by wire netting below, to prevent broken glass falling on the firemen when extinguishing a fire.

It will be observed in reading the foregoing specifications that, from a fire standpoint, the aim is to secure substantial enclosing walls; substantial floor supports; fireproof enclosures for elevators, staircases, dumb-waiters and all communications from story to story; to avoid hollow concealed spaces; and to secure a fire-resisting roof. These are the main points to be kept in mind, and the necessary details and precautions to be observed ought naturally to occur to any intelligent and conscientious architect or builder.

Perhaps the four most important considerations to be observed in slow-burning construction are:

Timbers not less than 12 inches thick;
Floor planking double and four inches thick and waterproof;
Openings from story to story cut off, to prevent drafts, and
Entire absence of concealed spaces which would afford harboring places for rats and mice or admit of a fire getting beyond control before discovery.

BUILDERS' RISK.

Buildings in process of construction are not profitable risks at the rates usually prevailing. They are to be sought, however, if the final occupation of the building will be such as to make it a desirable risk when finished. It is, therefore, advisable to secure the risks of enterprising builders, but, as already stated, to endeavor to have policies written for a year, since the insurance of such buildings for the time of the builder's risk only would be a very unprofitable undertaking.

It is during construction that the agent may be of the greatest help to his company by securing safety in flues, hot air pipes, &c., &c., and at the same time of great assistance to his customer, with the result, further, of getting his own commission on the insurance of a long-lived building, instead of for only one or two years.

Much of the unsafe building of the present day is due to ignorance of the principles of safety on the part of builders and

to negligence on the part of underwriters. In most instances if the owner of a building in process of construction were informed that a wooden mansard roof, for example, would not only endanger his building but cost him a considerable sum in extra premium each year, he would probably be induced to correct so serious and unnecessary a fault in his plans.

It is especially important that shavings and other rubbish should be removed daily, and that buildings should be secured at night so that mischievous boys and malicious persons may not gain access to them. Where the building is a valuable one a watchman should be employed by the builder. Fires in buildings in process of construction are due largely to the slaking of lime left where water can reach it; to careless plumbers, gas-fitters and roofers, especially in the use of fire-pots, and to the spontaneous ignition of painters' oily overalls. Millions of dollars worth of property has been destroyed by fires starting from these various causes.

CAUSES OF FIRES.

If the problem of reducing the unnecessary fire waste of the country, now amounting to more than one hundred and sixty million dollars per annum, is the most important confronting the citizen as well as the underwriter, then a study of the causes of fires, with a view to eliminating as many of them as possible, is one of the most important studies connected with insurance, and one which should engage the profound thought of every conscientious insurance agent. Inasmuch as no one can tell where any fire may end which starts in the compact portion of a city, the importance of preventing one from starting need not be argued. The fire which destroyed Chicago started in a cow-shed; that which burned Jacksonville, Florida, in a cheap manufactory, which ought not to have been located where it was. Fargo, Dak., was destroyed by rubbish in rear yards.

When is taken into account that more than sixty per cent of all the fires which occur, start from preventable causes, we may well give this important subject sufficient space.

There is another reason, too, for publishing a list of causes. The insurance agent is confronted everywhere, when soliciting business, with the statement, honestly made, by the property-owner, "there is no way for a fire to start on my premises; there are no fires or lights in the building, and I might as well carry the risk myself." It is well for such an one to have presented for his consideration some of the hundreds of ways in which a fire might start outside of human agency, not overlooking the danger of human agency in the shape of malicious personal enemies, insane incendiaries—pyromaniacs, so-called —or that class who, without any animosity whatever, have been known to set fires merely for the purpose of seeing fire departments extinguish them.

If the numerous persons who go without insurance, or con-

tent themselves with short insurance, supposing that their risks cannot burn, could be informed as to the hundreds of ways in which fires start, they would not, at prevailing rates of insurance, fail to take out a sufficient amount to protect them; and a shrewd agent would need only to enumerate these various causes to become a successful solicitor.

The following from a New England paper shows that some citizens are as well posted as to causes of fires as some underwriters.

"The Causes of Fires. The means of preventing fires may be suggested by a glance at some of the causes from which they originate. Cotton waste or other materials for spontaneous combustion thrown into a by corner; ashes recklessly knocked from a pipe or cigar; the stump of a burning match thrown into combustible materials; a stove overheated; a lamp carelessly broken; a pot of varnish left to boil over; a furnace room neglected; a plumber's fire uncared for; matches heedlessly dropped into straw or shavings, or given to children or left for rats or mice to drag between floor and ceiling or in a stable where horse feet can ignite them; clothes left near a stove or gas jet; a wooden ash receiver; a defective flue; a broken lantern—these are some of the starting points of conflagrations that devour whole villages and eat out the heart of cities. If these simple causes were not allowed to exist, their terrible effects would not follow. Colonel Simonds, proprietor of the American House in Greenfield, Mass., recently related an incident in his own experience, which aptly illustrates this point. At eleven o'clock, one night, he swept the litter from the smoking-room in his hotel out through the back door on to a heap of kindling stuff in the wood-room, and prepared to retire for the night. Five minutes afterward he returned to the spot and found the shavings and wood on fire. The force of his broom had lighted a match that had been dropped into the dirt he had swept out. He said that if he had not had occasion to return to his wood-room, the hotel would have been burnt and he should have thought it the work of an incendiary, as there was no fire kept in that part of the building, and he saw himself that it was just right before retiring. The Colonel also stated that he one day threw a cigar which he could not make burn, and believed was entirely out, among some papers; and half an hour afterwards he found the papers in a roaring blaze. Thus it is that men sow the seeds of conflagrations when they least think of it. All should be more careful. What we need is the habit of keeping matches, and all other possible sources of combustion, where they cannot be the means of destruction."

The writer has kept, for many years, and on a more accurate basis for the last ten, a careful record of fires, analyzed according to their causes, under injunctions to adjusters, already referred to (p. 44) to give their opinion, after careful consideration of all the facts while on the ground, as to the cause of any loss adjusted by them.

The percentage of losses attributed to unknown causes, on city, town and village risks, went down under the injunction to express an opinion, from 40% of the total amount of losses from all causes, in 1886, to 20% of such amount for the last five years term. The percentage of farm losses from unknown causes did not show so much variation, being about 14% of the whole number in 1886, and remaining at practically the same figure for later years. The explanation is obvious. The cause of a farm loss is usually easily ascertained by an intelligent adjuster, especially in the case of partial losses, while the total losses are divided almost uniformly among incendiarism internal and external, carelessness, defective flues (which are estimated to cause over 20% of the whole amount of losses) temporary vacancy and "unknown."

Eight per cent of the amount of farm losses were due to lightning to live stock and a like percentage to lightning to buildings, showing that 16% of all the losses are due to lightning, and that about 23% of all the premiums (allowing for cost of adjustment) are needed to pay them—a fact generally overlooked by those underwriters, who are disposed to throw in the lightning clause for nothing. With a profit ratio of 5% (seldom secured), to give, for nothing, indemnity against a hazard which causes 16% of the losses and, therefore, requires 23% of the premiums, it is obvious that rates need to be more carefully adjusted than at present.

Kerosene lights in barns, open fireplaces, burning out of soot in chimneys, defective stove-pipes, stove-pipes through side walls, &c., have each caused about one per cent of all losses on farm property.

Other causes of fires on this class (farm property) were incendiarism internal, about 4% of the total amount; incendiarism external, by enemies, tramps, &c., about 12%; the remainder being caused by gasolene stoves and lamps; prairie, running grass and forest fires; sparks from threshing-machines; locomotive sparks; chimney sparks; smoke-houses; spontaneous combustion; rats and mice.

On the business other than farm, the fires attributed to unknown causes were about 20% of the entire number; exposures about 20%; lightning to buildings, 2% (lightning seldom causes

loss in cities in buildings with metal roofs and well grounded metal leaders and water pipes); incendiarism internal, 4%; external, 9%; mechanics, 1%.

The remaining causes, in which carelessness figures largely, are matches, smoking, candles, swinging gas jets, lights in show windows, kerosene oil, electricity, leaking gas pipes, gasolene machines, lamps and stoves, fireplaces, furnaces, stoves and other heating apparatus, steam pipes, etc., dry-rooms, vacancy, sparks of locomotives, chimneys, overheating of ashes, illuminations, spontaneous combustion, sunlight through glass, explosions, sawdust spittoons, rats and mice, steam drying apparatus, friction, gas engines, and conflagrations—which latter cause from six to ten per cent of all the losses.

The successful agent, therefore, will bear these figures in mind; not alone to persuade indifferent insurers as to the danger of fires from causes which he cannot control, but with a view to correcting faults while inspecting. He will thus be enabled to discharge his duty to the community in which he lives, his duty to the company he represents and his duty to himself; for his reputation as an agent and the esteem in which he is held by his company will be largely dependent upon his escaping losses which come under the designation "preventable."

It will be observed that the percentages of the following table differ from those I have given, which were prepared by tabulating the causes assigned as matters of careful opinion expressed by the adjuster on the ground. Such statistics are more reliable than tabulations by city and State officials, published in insurance reports. They must get their information from persons like firemen and others, who have only limited opportunities for investigating the facts. The adjuster, on the other hand, has plenty of time for this purpose, and what firemen or others may learn about a case is easily available, as well, for his consideration.

Out of the total number of fires in the City of New York (1,396) for a single year, four hundred and thirty-nine (439) were attributed to carelessness with matches. As of these only forty-two were caused by children, it follows that those of mature age, if not of mature judgment, are culpably and generally negligent.

Gaslight in show-windows caused.................75
Leakage of gas-pipes and metres (probably from carelessness in approaching them with lights).. 39
Boiling over of grease, pitch, tar, &c............. 19
Hot ashes and coals.............................. 17
Malicious mischief................................ 18
Kerosene oil (upsetting of lamps, use of it for kindling fires, &c)...........................112
Spontaneous combustion........................ 39
Accidental, specific.............................. 77

In all eight hundred and thirty-five (835) fires out of 1,396, nearly 60%, due, in one year, to carelessness, and, therefore, preventable.

A careful insurance adjuster once told me that, going to his room in an office building, after the work of the day, he threw his cigar away as he unlocked his door. While writing at his desk, a moment later, it occurred to him to see where the cigar had been thrown, and he found it burning in the sawdust of a sawdust spittoon in the hallway. A less careful person—perhaps any other than an insurance man—would have failed to take the precaution, and the building would, probably, have been destroyed that night.

It is in this way that fires so frequently start, with sawdust spittoons, into which matches, cigars or lighted cigarettes are thoughtlessly deposited. Insist on their removal.

One of the best receptacles for keeping matches is an ordinary stone jar, with a cover. It protects them from dampness and from rats and mice, and even if they should become ignited they are not likely to do any damage.

Stoves, Stove-Pipes, &c. It is probably unnecessary to say to any person of ordinary intelligence that stoves should be free from cracks; that the floors under them should be protected with zinc (brick platforms are not safe, as coals of fire sift down between the bricks); that the plastering on walls near stoves should be unbroken, not leaving exposed lathwork; that wood should not be piled under or near them; and that stove-pipes should not enter chimneys at a point out of sight or in unused rooms, where parted joints may emit sparks, and where the coating of dust and ignitible substances, which always collect

on the upper surfaces of pipes running horizontally, is not likely to be seen. These points should be especially noticed in bagging factories, cotton mills and other establishments where fibrous collections are incidents of the risk.

Stove-pipes should never pass out of a window, through the roof or through the side of a building. Where they do, the risk should be declined. Nor should stove-pipes enter a chimney vertically, at the bottom of a flue starting from a ceiling above, as there is danger of fire from burning soot falling out of the flue through the space around the pipe.

Most insurance companies decline to insure buildings where stove-pipes pass through the roofs, even though the building be a small summer kitchen or "lean-to," not merely because of the danger of igniting the roof at the point of exit, which is always to be considered, but because of the danger of flying sparks, which find lodgment under the edge of shingles, ignitible as tinder after a dry season, and because of the danger, also, of igniting birds' nests or rubbish in the cornices and eaves.

A stove-pipe may sometimes be permitted to pass out of the roof of a summer kitchen or "lean-to" if properly protected, but where stove-pipes pass through a roof they should in all cases be double, with at least an inch of space between the pipe itself and the outer or "sleeve" pipe, and the woodwork of the roof should be cut away at least six inches from the pipe, which should be held in place by a zinc or tin plate, to keep it at all points equidistant from the roof.

Such risks should be referred to the company for consent before issuing the policy. There is little or no profit in the class, and no insurance company would regret losing them.

Tile Chimneys. These are quite common, and as dangerous as they are common. They are liable to crack, even where the tile is vitrified, or well burned. The double iron stove-pipe is preferable. Indeed, it is a grave question if the double iron stove-pipe, properly secured and extending a sufficient height above the roof, is not preferable to the highly dangerous "half brick" chimneys, so called, only four inches thick, which are sometimes built upon wooden shelves or which rest on wooden joists. Such chimneys should be prohibited by law. The difference in cost between a poor chimney and a good one is so slight,

and the danger to life as well as property so great, that no reasonable man would be content with the sham if he were informed as to the actual difference in cost and appreciated the danger to the lives of his family.

A tabulation of some twenty-three thousand fires in dwellings and farm property showed $7\frac{1}{2}\%$ of the total number of losses due to defective flues, and 20% of the total amount of losses due to the same cause.

Lighting. Movable gas or lamp brackets should be secured by stops, to prevent their being swung under or against woodwork. They should not be nearer to a ceiling above them than 36 inches, and should be provided with hanging metal or glass shades. Metal nailed to woodwork is objectionable if the flame is within twelve inches of it, unless, as already explained, an air space is left behind the metal.

Lights in Show-Windows. Are a frequent cause of fires; glass globes and wire netting should be provided to prevent contact with ribbons, laces, &c., &c., which may be blown into the jet by a passing draft, as when a door is opened. A safer method is to have the lights arranged above the goods, with reflectors. Electric lights *properly installed* are better.

Ashes. These should not be permitted in wooden receptacles. Wood ashes are liable to ignite spontaneously after they are supposed to be cold.

Cleanliness. Probably more fires are due to want of cleanliness, especially in cellars and out of the way places, where rubbish is allowed to accumulate, than from all other causes except defective flues. All rubbish is objectionable, and the sweepings of floors, particularly of drug stores and grocery stores, where sawdust is used, are especially liable to cause fires. Fires resulting from carelessness form such an alarming proportion of those from all causes as to require unusual care on the part of insurance agents and inspectors in pointing out and explaining its dangers. Most householders are ignorant of the dangers of spontaneous combustion and the necessity of keeping matches in stone jars, to prevent their being ignited by rats and mice or by cockroaches. An agent at Jacksonville, Florida, told me that, on one occasion, while his family was absent from the city, he went to his house at noon, and while in one of his

rooms heard a sound behind him, and, turning, saw a box of matches which had been ignited by the gnawing of a cockroach —one of the largest he had ever seen—which frightened by the fire was running down the leg of the table on which the box of matches stood. Here was an instance, capable of proof by an intelligent man, of a danger which most people would ridicule as improbable.

A recent fire in California was extinguished at a point where a number of burned rats and charred matches were found occupying the same paper box. It is almost safe to assume that a risk should be declined where chronic carelessness is discovered as to the use of matches. Where they are found left loose upon shelves, in closets and drawers, a fire is almost certain to result.

The following taken from the *Journal of Commerce and Commercial Bulletin*, *N. Y.*, as to the dangerous affinity between mice and matches is interesting.

"A great deal has been said and written about mice starting fires by gnawing at the heads of matches, but it is seldom that positive proof of the assertion can be found. This week Fred Weddigen, a Williamsport, Pa., agent, received from a grocer a box which showed just how such fires are started. In this instance one-half of the matches were gone and the remains were used in building a nest for the mice. Two young mice, probably as many days old, were found in the nest. The mice gnawed the wood of the match until it resembled excelsior. All but the heads of the matches were used. The heads were carefully piled away in one corner of the box under the nest. It is when the mouse gnaws too close to the head that the fire is started. Instantly one is ignited the shavings in the box blaze up, and sometimes serious conflagrations result."

No more dangerous practice exists than the common one of keeping matches, either loose or in paper boxes, in drawers of bureaus, office desks, &c., the sliding motion of which, as in opening or shutting, frequently ignites them. Fires may be caused in this way by the closing of desks in offices, which do not break out until all have left the rooms for the night.

Safety Matches. The use of "safety matches," which will not ignite unless brought in contact with a specially prepared surface, should be encouraged as tending to safety.

Some persons are constitutionally careless. Some years ago a fire resulting in a loss of over half a million dollars was caused by one of the proprietors of a warehouse lighting the gas with

a piece of paper, which he threw aside and which set fire to the premises, although it was his own rule of the warehouse that only tapers should be used for lighting purposes.

Reading at night while in bed, with a candle or lamp by the bedside, is a common practice with many persons, especially with servants and children, and results in many fires.

Screens full of clothes are frequently placed near stoves to dry, where a slight movement of the air or draft from an open window or door will precipitate them on the fire. Clothes which have been freshly cleaned with benzine or alcohol should never be brought near a fire. The contents of fireplaces and stoves are often pulled out on the hearths at night, instead of arranging them in the grate; and kindling wood is often piled in ovens to dry for the morning fire.

Working over hours causes many fires, through the sleepy indifference of tired workmen, especially where the overtime work is only for a few hours, as, in the hurry to get home, they are liable to leave without taking proper precautions to see that there are no hot journals, &c.

It is a grave question whether all-night work is not less hazardous than half-night work. Where employees work half the night to make up time, and go home tired out, they too frequently fail to examine journals and put out fires, which start after they leave, when there is no one to extinguish them.

Numerous fires occur in cities where rubbish, waste paper, packing material or dried leaves accumulate under open gratings, where falling matches or cast away lighted cigars will ignite them. Where windows are below the level of sidewalks, with areas for the admission of light, the accumulation of dried leaves is a special danger.

As a rule, dangerous combustible substances, like gasolene, naphtha, lime, phosphorus, &c., &c., are not so dangerous in those risks, like drug stores or chemical works, where they are thoroughly understood and of which they are incidents, as where they are mere accidents and where the parties using them are ignorant of their dangerous properties. Lime, for example, is more dangerous in paper mills and grocery stores, where it may be kept for sale, than with those who deal in it in quantities by wholesale. Oily waste, which every cotton manufacturer knows

will burn spontaneously, and which he carefully keeps in a metal receptacle during the day and removes from his mill at night, is often the cause of fire in machine shops and other mechanical risks, where it is used to wipe off machinery and afterwards carelessly thrown aside in some closet or rubbish box to endanger the property. Linseed oil, which any painter knows to be dangerous if fibrous material is saturated with it and it becomes covered up, is apt to cause fires by the careless throwing away of cloths with which servants have rubbed off furniture or hardwood floors. The intelligent and careful insurance inspector will take pains to explain such matters when examining buildings.

It is not safe to infer that the risks of those who have never had a fire do not need to be carefully examined. Long immunity from fires seems to have a natural tendency to make persons careless.

Spontaneous combustion probably causes more fires than are attributed to it, from the fact that, in order to determine whether a fire originates in this manner or not, it must necessarily be detected at its very commencement and before the flames have destroyed the evidence of its cause; and as the substances which cause the spontaneous ignition are quickly consumed, the incendiary is seldom caught red-handed in the act. Most people, moreover, are not aware of the dangers of spontaneous combustion, and, where ignorant, such unexplained fires are usually attributed to incendiaries, defective flues or other causes. It is for this reason that an expert insurance inspector will make careful examination of all closets and concealed spaces, and will especially examine attics and cellars—those portions of a building which the owner himself too frequently overlooks.

It is only within recent years that spontaneous combustion has been reasonably understood. For many years, a fire originating from this cause was regarded as a phenomenon; but, owing to the investigations and explanations of scientific men, and to the efforts of underwriters in collecting and publishing the statistics of fires, with a view to lessening their losses, the ignition of many substances without the application of fire heat or flame, merely by the chemical action of the materials themselves, has come to be regarded as an accepted fact, and few persons are so ignorant as to doubt it.

Spontaneous combustion is generally due to the absorption of oxygen from the atmosphere by various substances which have an affinity for it. The rapid drying of siccative oils, especially vegetable oils, like linseed, and the drying of moist charcoal, result in the rapid absorption of oxygen to the extent of ignition.

It will be understood, also, that heat results from almost every operation of force; the friction of machinery, the turning of iron in a lathe, the cutting of threads on a bolt, the driving of a nail into wood and especially into hardwood, the electricity generated by a rapidly moving belt, and a hundred or more processes familiar to mechanics. It is principally of the slow and insidious self-ignition of inert substances, not suspected by those whose property is endangered, that we propose in this connection to treat. The fire which every miller knows will result if the stones of his mill are permitted to run in contact when the feed is shut off by some accident is not more certain than that which will ensue from the oily waste which he uses to wipe off machinery and afterwards throws aside in some corner to lie neglected and forgotten until it bursts into flame.

Heat results from chemical action as surely though sometimes more slowly than from the application of flame. Of those substances which absorb oxygen most rapidly, the siccative or drying vegetable oils, such as linseed, cotton-seed, palm oil, almond, rapeseed, &c., are the most dangerous. They are not dangerous, however, in bulk, as in barrels or cans, but when distributed over fibrous substances, rags, &c., especially when covered up so as to confine the generated heat. The petroleum oils, however, are not dangerous as to spontaneous ignition, and even a mixture of petroleum with vegetable oils lowers the temperature almost invariably to the point of safety. Petroleum products are dangerous, of course, on account of their vaporizing qualities and ignitibility.

Sawdust mixed with linseed oil will ignite in a few hours; so will cotton waste. Cotton waste saturated with linseed oil will burn in from two to ten hours, according to circumstances; with rape and olive oils (and large quantities of olive oils in the market are really cotton-seed oils) in from five to six hours. Ignition takes place more rapidly with silk waste than with cotton.

It should be remembered that oily rags are liable to be found

in almost every collection of rubbish, and it is for this reason that inspectors should decline buildings where rubbish is allowed to accumulate. Wet cotton, damp oatmeal or bran, and most vegetable substances, when packed together in a confined place, without being sufficiently dry, undergo fermentation or heating and are liable to take fire. Spent tanbark is liable to ignite spontaneously when stacked up in heaps. It is used in white lead works for this very reason, to generate carbon dioxide by its fermentation in the corroding beds. Wet iron filings generate heat, and so also does all rusting iron; in fact, iron rust is combustion or oxidation of iron. Very fine fragments of iron and steel by rapid oxidation become red hot—the theory of striking fire with a flint and steel—and it is now claimed, with some show of reason, by an English scientist that some of the fires caused by steam-pipes may originate in this manner from the rust of iron. He says:

"When oxide of iron is placed in contact with timber, excluded from the atmosphere, and aided by a slightly increased temperature, the oxide parts with its oxygen, and is converted into very finely divided particles of metallic iron, having such an affinity for oxygen that, when afterwards exposed to the action of the atmosphere from any cause, oxygen is absorbed so rapidly that these particles become suddenly red hot, and, if in sufficient quantity, will produce a temperature far beyond the ignitible point of dry timber. Wherever iron pipes are employed for the circulation of any heated medium (whether hot water, hot air or steam), and wherever these pipes are allowed to become rusty, and are also in close contact with timber, it is only necessary to suppose that under these circumstances the finely divided particles of metallic iron become exposed to the action of the atmosphere (and this may occur from the mere expansion or contraction of the pipes), in order to account for many of the fires which periodically take place at the commencement of the winter season."

The iron scraps or shavings, lathe chips, etc., to be found in small heaps on the floors of machine-shops, and which are always more or less oily, are particularly liable to heat if they become rusty; and fires in such heaps, in the yards of iron-works, where exposed to alternate rain and sunshine—*particularly where sawdust is used, as in the case of nut and bolt works*—are far from uncommon.

In one instance, where a large machine-shop was flooded by a sudden freshet which thoroughly wetted such heaps upon the floor, they began to heat from the rusting, immediately after the water had subsided.

The *spontaneous ignition of coal mines* is supposed to be due to the chemical action of water and iron pyrites, the decomposition of sulphurets of iron in the slates, which rapidly absorb oxygen. The fire in the Hickory Shaft, an extensive colliery near Pottsville, Pa., in 1870, it is claimed, originated in this manner.

"The yellowish matter commonly called copperas stone, brazil, rust balls or marcasite, often adhering to or mixed with the substance of pit coal, consists of sulphur and iron, and is a species of pyrites. These are picked out and laid aside, and such heaps have been known to take fire, as at Whitehaven and near Halifax, and at Puddle Dock, London. Water having obtained access to it, it burned like red hot coals." —*Bishop Watson's Chemical Essays, vol.* 1, *p.* 194.

It is well known that all finely divided substances, such as sawdust, wood lathe dust, cotton, wool, hemp, rags, rubbish, floor sweepings, etc., etc., when saturated with oil, and especially with the siccative or drying vegetable oils, such as linseed, olive, cotton-seed, rape-seed, etc., are liable to burn spontaneously. This combustion is accelerated by the application of heat, whether artifical or that of the sun, but takes place also when the substance becomes in any manner covered up, as in heaps, barrels or boxes, so as to confine the heat generated. The small scraps of oil-cloth, for instance, so harmless when scattered over the floors of a carpet store, become dangerous when collected in heaps or quantities.

The following report of what is termed a "curious case of spontaneous combustion" was published in the New York Sun:

CURIOUS CASE OF SPONTANEOUS COMBUSTION AFTER WOUNDS HAD BEEN DRESSED.

LOUISVILLE, Ky., June 4, 1901.—What is considered a remarkable case of spontaneous combustion is brought to light by Dr. ...., who for several years has been Dean of the Kentucky School of Medicine and, for twenty years, a professor of chemistry of that college. The report of the case comes to Dr. Woody in a letter from a reputable Kentucky physician. In part the letter says:

"A child about four years old was burned on the extremities and abdomen by its dress catching on fire. The burns in each locality, being of moderate severity and strictly superficial, were not sufficient to have caused a fatal result. The burns were dressed in the following manner: First dusted with subnitrate of bismuth, then linseed oil was freely poured on the parts wrapped in cotton batting and a sheet pinned around it snugly, and lastly a quilt was wrapped around this.

"The child was put to bed and instructions were given not to remove the dressing. The child complained bitterly all night long, the parents thinking that the suffering was due to the original burn. About daylight they saw smoke arising from the bed, but being very ignorant people thought it was the 'fire leaving the burn,' and did not remove the dressing until later, when the child was dying. Upon removing the dressing they found the inner aspect of the sheet was scorched, the cotton batting was burned almost entirely up, over the abdomen, and still smouldering.

"The child was burned into the intestines in three places and died in a few moments. There was not the least evidence or the remotest possibility of the second fire originating from the outside, and there was absolutely nothing used but the bismuth and linseed oil."

Dr. Woody gives the following explanation:

"Under the circumstances it must have been spontaneous combustion of the linseed oil. The bismuth subnitrate and cotton, divided finely, distributed the oil and exposed a large surface to the action of the oxygen of the air. The warmth from the body added to the heat and hastened the oxidation, and the covering confined the heat until the oxidation became an actual combustion."

The only thing that is curious about the matter is that a physician could overlook the danger of cotton fiber saturated with linseed oil and covered up so as to confine the heat. The conditions in this case are exactly those which result invariably in rapid oxidation and so-called spontaneous combustion, and it is ignorance of the inevitable consequence of such conditions that leads to so many fires, year by year, from spontaneous combustion, which probably contributes more to fires classified as "unknown" than any other one cause, because the evidences of spontaneous ignition, as already explained, are naturally almost invariably destroyed by the fire.

A fire occurred in the Wanskuck Woolen Mill of N. Providence, R. I., in an imperfectly scoured piece of heavy woolens placed, while still warm from the drying machine, *under several other pieces.* Loss on goods $1,000 before discovered and extinguished.

In the same year a fire occurred in the repair shop of the Everett Mills at Lawrence, Mass., from spontaneous combustion in a box containing some lathe dust from spindle bobbins (which had been made a little more dishing.) These bobbins when new had been soaked in *linseed oil.*

In June of the same year a fire occurred in the Pemberton Mill of Lawrence from spontaneous combustion in black and brown yarns lying in bins, probably from the small quantity of oils used in scouring these yarns.* Loss, $17,000.

A fire occurred in the Cordis Mill, Millbury, Mass., in an attic mule room.

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*Goods or yarns recently *dyed black* should be well aired and cooled before being packed.

in a small quantity of carriage flyings which lay under a skylight where they were slightly wet by a shower and afterwards exposed to a bright sun shining through the glass.

A fire occurred in black yarns in the Plunkett Cotton Yarn Mills, Adams, Mass., August, 1891, and in aniline black cotton at New York Mills, N. Y., July 14, 1901, and in dyed skeins of yarn at the Thorndike Cotton Mill, Thorndike, Mass., same year, and in bundles of cloth dyed black in the United States Finishing Company's risk at Norwich, Ct.

In Mr. Edward Atkinson's careful statistics of fires in mills insured by his company much valuable information will be found as to spontaneous combustion.

It is well known that fires occur from the heating of webs fresh from the loom, if piled on top of each other, or covered up in any way before being scoured.

Too much care cannot be observed as to the oil used on stock; only a safe animal oil should be used, pure sperm, pressed or saponified lard oils, or a *pure* olive. Olive oil has of late been so adulterated with cotton seed oil (exported for the purpose) as to render its use on wool or cotton highly dangerous.

To avoid fires from spontaneous combustion, all dirty or greasy cotton or woolen waste should be removed to a building especially prepared for its reception, (and not exposing the mill) and never left in the mill over night. The cards should be cleaned in the forepart of the day, the waste passed through the duster and removed to the waste-house. It is, moreover, to the manufacturer's interest to clean the waste as soon as it comes from the card, since if left to accumulate, it becomes matted and will not clean well. The pickers should also be daily overhauled and all waste removed.

Sweepings of floors nearly always contain more or less oil, and should not be allowed to accumulate in corners, but should be carefully removed each afternoon.

Too much pains cannot be taken, in case any painting is done on the premises, to see that no rags, waste, or cotton saturated with linseed oil (a most dangerous combination) is left in any part of the building. The examinations for such negligence should be the more thorough that the danger is greatest when such materials are covered up in any way; a condition in which, as before explained, they are most likely to ignite, *while, at the same time, most likely to elude a search for them.*

The increased use of hard woods as a finish for the interior of buildings, especially in offices, engine-rooms, stair-ways, etc., and the habit of *re-oiling them from time to time*, renders the observance of these precautions extremely necessary.

Many other substances are known to burn spont neously, such as lampblack, oiled clothing, wet hemp ropes and mats, phosphorus, bituminous coal in large heaps, moist hay, etc., etc.

An experiment showing the manner in which subterranean fires possibly sometimes originate is also mentioned:

"Twenty five pounds of powdered sulphur were mixed with an equal weight of iron filings. After being kneaded together with a little water to the consistence of paste it was placed in an iron pot, covered with a cloth, and the whole buried under ground about one foot deep. In eight or nine hours the earth swelled, grew warm and cracked; hot sulphurous vapors were perceived; a flame which dilated the cracks was observed; in short, a subterraneous fire, producing a volcano in miniature, was spontaneously lighted up from the reciprocal actions of sulphur, iron and water."

Bituminous Coal in large heaps, owing to the decomposition of sulphuret of iron which it contains in large quantities, has caused many fires, the most serious of which, probably, was that at Copenhagen, about the year 1804, when 1400 buildings were destroyed. Numerous fires have occurred at the different U. S. Navy Yards, where large quantities of the coal are kept —notably at Brooklyn, Boston, Portsmouth, and in a heap of coal under the trestle of the Louisville and Nashville R. R., at Nashville, Tenn.

In December, 1875, a fire started in a large heap of 1300 tons of bituminous coal stored in the basement of a store-house connected with the Burlington Woolen Mill at Winooski, Vermont, no doubt caused by the decomposition of sulphurets in the coal. A singular fatality has attended many of the ships in the carrying trade of soft coal, unexplained except upon the hypothesis of spontaneous combustion of the coal.

Bituminous coal should be kept in small heaps, out of doors, protected by sheds from the rain, but where frequent currents of air may keep it cool. It is possible to have pipes running into the heap to ventilate the pile and to determine a rising temperature by thermometers and other tests.

Everyone is familiar with the spontaneous ignition of *unslaked lime* when dampened in any way, and yet it is frequently stored, as elsewhere mentioned, in a careless manner, where

exposed to rain by an open or broken window or a leaky roof, or in warehouses on water fronts where freshets may reach it. Almost every spring fires from freshets in lime warehouses are recorded.

As I write, information is received of a fire resulting in a \$10,000 loss at Richmond, Va., caused by the water from a freshet coming in contact with lime in the plant of Warner Moore & Company, millers and feed supply men.

The ordinary *oiled clothing* to be found in ship chandlery stores, and in clothing stores near the water fronts of cities, is dangerous when in piles because of the linseed oil used in the manufacture. It should always be hung up and exposed to free currents of air, by which the heat evolved is conducted away. Stocks of goods, where it forms a large percentage of the stock and *where it is kept in piles on shelves or counters or in drawers*, are undesirable risks.

Charcoal will burn when pulverized or finely divided, in heaps. Indeed, a ton or two of charcoal in a state of minute division is almost certain to ignite spontaneously. In an experiment which was made in France, under government direction, it was found that the inflammation occurs towards the centre of the mass, in such cases, at about five or six inches below the surface. The temperature is constantly higher in this place than in any other. In another instance, where small charcoal was thrown into a heap ten feet square and four feet deep, containing two or three tons of charcoal, the temperature in three days had increased to 90°, though at first only 57° (that of the air at the time.) On the sixth day it was 150°, and on the seventh day *combustion had occurred in several places.* The charcoal had been made ten or twelve days before the experiment took place, had been freely exposed to the air, and was not, in any sense, what is known as "freshly burned" charcoal. When *finely powdered*, charcoal is more dangerous than when in sticks. Sixty pounds of powdered charcoal is sometimes a large enough quantity to ignite spontaneously. Lumps of charcoal, if moist and subjected to a slight drying heat, will ignite (see the interesting experiment of Professor Jackson, under head of steam-pipe fires, page 166).

Dr. Kane, in the narrative of his Arctic explorations, men-

tions a fire originating unmistakably in the "remains of a barrel of charcoal which had been left in the carpenter's room of the ship, ten feet from the stoves and with a bulkhead separating it from them."

Phosphorus—which should always be kept under water, and which, when it becomes uncovered, by evaporation or leakage of the water, absorbs oxygen so rapidly at a temperature below 70° as to take fire readily, especially when in a powdered state—is very dangerous. Sufficient powdered phosphorus is sometimes to be found on the head of matches to ignite in this way. Some fires are possibly due to the ignition of matches by the heat of the sun, which, in a window and in summer, is frequently as high as 140°—more than enough to ignite phosphorus. The ordinary lucifer match composition is luminous on dark, warm nights, showing that oxidation is going on and a process of heating; hence large quantities of matches should not be kept in stores, especially where any heat—whether of stoves, steam-pipes, or of the sun—can reach them.

Chlorine, one of the most energetic of elementary substances, largely used in bleaching, in the form of chloride of lime, chlorate of potash, chloride of magnesia, &c., has a powerful affinity for hydrogen, seizing it in many of its liquid and solid combinations, as in volatile oils, which it inflames, and in cotton and flax. It spontaneously burns many substances. Some of the metals, when finely divided, take fire spontaneously in chlorine, such as brass-leaf or powdered antimony.

Lampblack is claimed to be dangerous, and there can be no doubt of its liability to ignite spontaneously if mixed with oils—especially linseed—which contain a large proportion of hydrogen. It is claimed to be the unsuspected cause, sometimes, of fires in shoe manufactories, in which risks it is urged by some that not over one day's supply should be permitted. As lampblack is almost always to be found near oils, as in paint shops, &c., care should be taken that it does not cause fires. Its use with putty, as in the case of furniture factories, or other risks, may supply the necessary material for combustion.

Tracing paper, made transparent with oil, in process of manufacture, if the sheets are not thoroughly dry and cool before piling, will take fire within an hour, on account of the linseed oil used.

Roasted coffee sometimes takes fire spontaneously. Its latent heat is greatly increased by the process of roasting.

It is well known that hay, when stored away too green or wet, is very liable to set barns on fire by the heat generated in fermentation. It is claimed that salt sprinkled in the mow is a preventive of heating, and that if the mow is pierced with holes to permit the escape of the gases and heat generated, no combustion can take place.

Tarred felt and moist hemp have been known to take fire spontaneously.

"Charged silks," viz., silks which have been treated with oil to increase their weight, and certain shades of dyed silks, are so liable to spontaneous combustion that, in 1872, their transportation was prohibited on German railways. A peculiar kind of nut oil was used.

Goods and yarns dyed *black*, possibly from some chemical used in the dye, especially if packed solidly together before the heat from the drying process at the mills has escaped from the cloth or yarn, are very liable to burn spontaneously.* No less than six fires occurred in 1873, in mills, from spontaneous combustion in black goods. One at the Norwich Bleachery, several at the Pacific Mills, one at the Silver Spring Dye Works, and one at the Danvers, Conn., Bleachery. In 1875 a fire occurred at the Washington Mills, Lawrence, Mass., in a roll of alpaca goods, dried on a drying machine the day previous; and, in the same year, at the Renfrew Manufacturing Company's Mill, Adams, Mass., in *Black Yarns*; and at the Lonsdale Bleachery, Lonsdale, R. I., in a pile of colored goods in the dye house.

The burning of several Russian ships in the harbor of Cronstadt was caused by the spontaneous ignition of firwood soot and rape oil varnish, wrapped in a bass mat and lying on the floor of the cabin, preparatory to painting a ship with it.—*Papworth's "Notes on Spontaneous Combustion."*

A vessel loaded with Guano which became wet with salt water took fire instantly.

It is claimed that buildings have been set on fire by spon-

*Probably due, also, to the fact that this color admits of greater "loading," the introduction of material to give weight to the goods, which would be apparent in the lighter colors.

taneous ignition of the guano of pigeons or other birds, and certainly some fires attributed to this cause seem to be more easily explainable on this hypothesis than on any other.

Fires have been known to occur from the heat of the sun concentrated upon light combustible materials, such as shavings, oily cotton, or sawdust, through imperfect panes of window glass, which serve the purpose of a "burning lens." When woodwork is deeply smeared with a coating of linseed oil, as is frequently the case in paint shops, carriage shops and other risks using it, it would not seem a difficult matter for the heat of the sun to ignite it.

Sunlight passing through a spheroidal glass vessel of water has been known to produce the same result.

A fire was caused in this manner in the laboratory of Dr. H. C. Bolton, of Columbia College, New York City. Upon entering the room at 9 A. M., he found a wooden table on fire, ignition having been occasioned by the rays of the sun passing through a spherical glass flask containing water.

Vessels at sea have been set on fire by means of the "bull's eye" glasses used to admit light between decks. Their use had to be discontinued and flat glass substituted. Captain Scoresby and Dr. Kane, it is said, succeeded in kindling fires with lenses made by them *of ice*, which very naturally "astonished the natives."

Almost every boy's book of "games" contains recipes for chemical combinations which will ignite without artificial heat, and it seems strange that owners of property will overlook or doubt the fact that the same dangerous conditions may be reached, every day, in storage stores and warehouses, by the accidental combination of many substances in common use. The explosion at the great fire in Broad Street, New York, in 1845, was undoubtedly caused by the accidental combination of saltpetre with the charred bags or other carbon.

Strong nitric or sulphuric acid, mixed with wool, straw or certain essential oils will cause combustion.

Calcined magnesia and sulphuric acid will almost instantly ignite. Chlorate of potash and loaf sugar reduced to powder will ignite with the addition of a drop of sulphuric acid.

"Fuming acid of nitre mixed with oil of turpentine will ignite

instantly, and *the experiment proving it is a very dangerous one*, to be carefully made, the experimenter being careful not to approach too close to the mixture."—Watson's *Chemical Essays.*

Wood which has been for a length of time in contact with pipes containing hot water or steam, seems to be reduced gradually to a condition favoring spontaneous ignition. The destruction of the English House of Parliament and many other fires have been attributed to this cause.

Vice-President Snow, of the Home Insurance Company, has secured valuable statistics as to the fires in dry-kilns and dry-rooms, and has practically, it seems to me, demonstrated that wood subjected continuously to heat for a given length of time gets into a condition where it ignites spontaneously. This will explain the numerous fires in dry-kilns and dry-houses, and enforce the necessity of discontinuing the use of wood in rooms subjected to high temperatures.

Many of the fires originating in *Broom Corn* warehouses are supposed to be due to spontaneous combustion resulting from the saturation of the fibre with oil from the seed, expressed by the process of baling and handling, and the numerous fires in *cotton gin houses* may be largely due to the ignition of cotton saturated with oil from the cotton-seed expressed during the process.

Paint shops are particularly liable to fire, on account of the linseed oil used. A paint shop in a building is always an objectionable feature, and in manufacturing establishments, such as plow works, carriage shops, agricultural implement manufactories and others, great danger exists from the carelessness with which linseed oil is frequently handled by persons ignorant of its dangerous properties.

Junk stores and rag stores are very liable to spontaneous combustion and are not safe risks to insure; aside from the questions of unsatisfactory values, which are always involved in the adjustment of losses on them, they contain at all times, miscellaneous rubbish picked up in the streets—wisps of oily cotton, greasy rags, oily cotton waste, etc., etc., and as they are generally in the hands of persons ignorant or indifferent as to the dangers of spontaneous ignition, they should be carefully avoided by the insurance agent, either as risks or exposures.

The agent must expect to find the danger of spontaneous combustion, however, in every class of risks. Even dwellings are not exempt from it. In one case a ball made by children out of woolen yarn which they had oiled to make it elastic and pliable, and had then covered with leather, thus fulfilling unconsciously all the conditions favoring spontaneous combustion, was found to have ignited spontaneously and burned to ashes. A notable instance of spontaneous combustion in a dwelling was where a mattress took fire. Upon examination it was found that, instead of being stuffed with hair, as was supposed, such materials as tow, flax, rovings, waste, and other substitutes, had been used by the upholsterer. A lounge, stuffed in the same manner, took fire. Numerous instances are reported each year to insurance companies of the spontaneous combustion of greasy overalls of painters left in buildings over night. In a case in Boston it was discovered that a pair of greasy overalls, which had been accidently covered up in the cellar, were on fire. In the case of a newly finished house, a fire started in a small pile of oil-cloth clippings, left by the carpet fitter. While spread out on the floor the heat was conducted away by currents of air, but in a pile it was confined, and the oily, vegetable fibre of the cloth ignited.

The sweepings of factories, drug stores, grocery stores, machine shops or other risks where oil is used or kept, are very liable to take fire, especially if allowed to accumulate in corners, waste barrels or boxes; and those risks where sawdust is used on the floors, such as drug stores and grocery stores, are particularly liable to fire from this cause. The breaking of a bottle of olive oil upon the floor of a grocery store, saturating the sawdust with which the floor was covered, caused a fire sixteen hours afterward. The sweepings had been left in a heap where sunlight reached them and accelerated the combustion. Olive oil has not been considered dangerous, but its adulteration with cotton-seed oil (very common of late years), makes it as dangerous as any other.

Receptacles for waste and rubbish, especially in mills, should be of *metal*, as they would then serve to conduct away the generated heat of their contents, and where, through any neglect, such waste should not be removed over night, the danger would be less than where wooden boxes were provided.

Wood—besides being itself combustible—is a poor conductor of heat, and serves to confine that generated until a dangerous temperature is reached.

An instance showing the necessity for the thorough examination of every portion of a risk, and particularly of those "out of the way" places which are so liable to be overlooked by owners and insurance inspectors, was that of a fire in a large establishment at Zanesville, Ohio, in which the rule was to burn all oily waste and rags each day, under the boilers. One of the workmen, having occasion to go into the attic, found it full of smoke, and an investigation revealed the fact that the fire originated in some greasy rags *in the space between the brick wall and the eaves of the roof*, where they had been hidden by a boy who desired to collect and sell them on private account. Fortunately the roof was of slate, instead of shingles, and served to confine the fire long enough to ensure its discovery and extinction.

As before stated, petroleum oils are not liable to cause spontaneous ignition. They have no affinity for oxygen, and their danger seems to be confined, as elsewhere stated, *to their liability to evolve dangerous explosive vapors*, and to their inflammability.

Among the authorities on this point are Prof. Anderson, of Glasgow University, who says: "By a special experiment I have found that petroleum does not absorb oxygen and, therefore, cannot cause spontaneous combustion." Dr. Hoffman, president of the London Chemical Society, says: "Petroleum oils are safer than animal or vegetable oils, inasmuch as they do not absorb oxygen, and cannot undergo spontaneous combustion." Prof. Wilson, of Edinburgh, says: "I find that mineral oil does not sensibly absorb oxygen, either alone or diffused through cotton wool, and cannot take fire spontaneously." Prof. Frankland, Dr. Wallace, of Glasgow, and other scientists add their testimony to this effect.

KEROSENE OIL.

Of late years, since the manufacture of kerosene by the Standard Oil Company, by which a safer grade of oil is sold almost without exception, fires have been less numerous from

this cause than in former times, when there were many oil refineries competing with each other for price and selling oil of low specific gravity, due only to the presence of heavier oils averaging in gravity with the lighter and more volatile gasolene and naphtha so that a specific gravity test would not reveal the danger. It is probably safe to say that there is, to-day, no kerosene in the market which would not stand the U. S. standard of 110 degrees flash test.

As an evidence that the losses formerly due to dangerous kerosene have been largely reduced by the improved quality of the article sold, I would offer the statistics of 34,000 fires, which show that less than six per cent of the number of all fires were due to kerosene oil lamps, and less than three per cent of the amount of losses from all causes attributed to kerosene. Of course, these figures should be considered in connection with the fact that electricity and gas have done away with the use of kerosene to a considerable extent, and also with the fact that the use of gasolene for lighting has to some extent done away with the use of the safer material; but the figures are evidence, nevertheless, supporting the contention that the kerosene as now put forth by the Standard Oil Company is a much safer article than it is supposed to be.

The statistics of the Massachusetts Insurance Department show a larger percentage of fires due to kerosene oil than the statistics I have quoted, but the Massachusetts figures are made upon a much smaller number of fires. For example, the Massachusetts figures show 1160 losses out of 8500 fires, whereas the figures I have quoted cover four times as many fires, the latter tabulation being based upon the careful report of adjusters on the ground in each case which, I think, explains the difference.

In 1869, Prof. C. F. Chandler was requested by the New York Board of Health to report upon "the traffic in dangerous kerosene." The result was an elaborate report, from which we shall quote freely, as occasion may require, in the following pages.

Crude petroleum, as it comes from the oil well, is a dark, greenish-brown liquid of offensive odor, chiefly a mixture of a great number of hydro-carbons—the average proportion of the

mixture being 85 parts of carbon to 15 of hydrogen. These hydro-carbons differ in volatility; some evaporate rapidly at ordinary temperatures, making it unsafe to approach them with a flame, while others are less dangerous. Their volatility is intimately related to their specific gravity or weight—the lightest being the most volatile while the heaviest possess the higher boiling points. Their inflammability is also intimately connected with their volatility and specific gravity.

The light, volatile oils ignite or "flash" on being approached with a lighted match, *no matter how cold they may be*, while the heavier oils can only be ignited when the temperature is raised considerably higher than that of the atmosphere.

"It must not be supposed, however, that the *specific gravity* of an oil can be considered a *sure index of its safety*; on the contrary, the specific gravity gives very little idea of its safety; for, while naphtha tends to render oil lighter, the average gravity of good oil may be maintained by the *presence of heavier oils*. A poor, dangerous oil may, in this way, actually be heavier than a safe oil."

Petroleum, as it comes from the wells, is subjected to a distillation or refining process, the first products of which are gases which require cooling with ice or compressing in order to condense them.

"Soon the vapors begin to condense in the worm and a stream of oil trickles from the far end of the coil into the receiving tank." It is at this point that the refiner may decide as to whether his oil shall be a safe or dangerous one, since it only depends upon the gravity at which he turns the product into the kerosene tank. If he waits until the product has a specific gravity of 58° Baume, before changing the direction of the stream from the coil into the kerosene tank, the result will be a safe oil. The price of crude naphtha is so low, however, as to make it a strong inducement for the refiner to turn it into the kerosene tank, where it will bring within a few cents per gallon of the market price of safe oil.

The product known as crude naphtha is separated, by redistillation, into (1) "GASOLENE,"—the lightest (used in gas machines, carbonizers or carburetters); (2) "NAPHTHA,"—used for oil-cloths, cleaning, and for many of the dangerous brands

of burning oil; (3) "BENZINE,"—used for paints and varnishes.

The operation of testing kerosene is merely that of ascertaining the temperature at which the oil *emits an inflammable vapor*—the "flash point"—or the temperature at which *the oil itself takes fire*—the "burning point." These tests, the "flashing test" and the "burning test," are often confounded, and when a law or ordinance specifies the "fire test," there is a doubt as to which of the two is intended.

"The 'flashing test,' which determines the *lowest temperature at which oil gives off an inflammable vapor*, is by far the most important, as it is the inflammable vapor *evolved at atmospheric or ordinary temperatures* which causes most of the accidents. Moreover, an oil which has a high *flashing* test is sure to have a high burning test, while *the reverse is not true.*"

The burning point of an oil is from ten to fifty degrees Fahrenheit higher than the flashing point, the two points being quite independent of each other. The "flashing point" depends upon *the amount of the most volatile constituents present—naphtha, etc.* While the "burning point" depends upon the general character of the whole oil, *two per cent. of naphtha* will lower the flashing point of an oil *ten degrees*, without materially affecting the burning test. The burning test does not always determine the real safety of the oil, *i. e., the absence of naphtha.* The "flashing test" should, therefore, be the only test mentioned in laws framed to prevent the sale of dangerous oils.

"What flashing point should be selected, as a standard of safety, is a question on which there is some difference of opinion. The higher the flashing point the safer the oil. Animal and vegetable oils do not flash below 500° to 600° Fahrenheit; hence it is impossible to have an explosion, or any burning accident, with a lamp or can filled with such an oil.

"The flashing point should be somewhat *higher than the highest temperature the oil ever reaches in the lamps or cans.* Our highest summer temperature does not far exceed 90° Fahrenheit, though a can of oil placed in the sun or near a fire might become much hotter."

"The point of 100° (a temperature sometimes reached in metal lamps) does not seem to be high enough to secure immunity from danger, though it may be said very few, if any, accidents occur with oil which does not flash below this temperature. In some State laws, 110° F. is fixed as a flashing point, and in one of them 120° F.

"When it is remembered that the temperature of oil in lamps sometimes rises above 100° F.—thus reaching a temperature at which even oils which do not emit a combustible vapor below 100° F. would be dangerous—it is apparent that 100° is too low a standard for safety; 120° F. would not be too high as a standard, and its adoption would not add three cents per gallon to the cost of the oil."

At ordinary temperatures gasolene and naphtha are continually giving off inflammable vapor, and a lighted match or lamp, at some distance from the material itself, will ignite it through the medium of the vapor.

The metallic attachments of ordinary lamps are sufficient to conduct the heat of the flame to the oil in the lamp, and to cause it to evolve dangerous and explosive vapors, unless the oil is a safe one. So long as the lamp is unbroken and kept closed, no explosion is likely to take place; but if *opened for filling*, near a *fire or flame of any kind*, an explosion is almost certain to ensue. It must be remembered that *actual contact of flame with the oil itself is not necessary*. The danger is from the vapor with which the vacant space in the lamp above the oil is filled. This vapor is invisible, is always under pressure—because gradually and continually generated in a confined space—and when released, as by the opening of a lamp for purposes of filling, expands in volume, sometimes sufficiently to fill a small room, and to reach the flame of a lamp or stove at some distance from the oil itself.

It is for this reason that lamps should never be filled at night; that kerosene should never be handled or sold within fifteen feet of any artificial light or stove; and it is for this reason, as well as on account of the danger from leakage, *that a can or barrel of oil should never be kept in the same room with a furnace, stove, or fire of any kind.*

A terrible instance of the danger from kerosene of a low flashing test, when kept or handled in warm rooms or near stoves, was that of a fire at Morton Station, near Philadelphia, by which, in consequence of the explosion of a one-gallon can of volatile kerosene or so-called "combination fluid," *four persons were burned to death.*

We quote from the published account of the investigation:

"The room in which the explosion took place had a low ceiling and a very large stove, which had been kept at nearly a red heat, in order to expedite a

large ironing. There was no light or fire in the room, except the one in the stove. A young woman, one of the victims, was still conscious and lived long enough to relate that her mother took the can of oil, removed the cork of the spout at the table—several feet from the stove—she instantly saw, on the removal of the cork, *a flash go from the stove to the can*, heard a loud hissing noise, and that was all she remembered!"

The explanation of this occurrence is very simple. The can of oil had been generating vapor in the warm room all day, until the space between the surface of the oil and the top of the can was filled with an inflammable gas under the pressure of its confined volume. Immediately upon removing the cork, the escaping vapor—expanding as it became released—filled the room and, igniting at the stove, caused the explosion.

Tests of kerosene should be carefully made. Instruments for making the tests are simply contrivances for applying a slow heat to oil in which the bulb of a thermometer is placed. Upon the application of heat, the lighter portions of the oil rise to the surface and are there converted into vapor which, when evolved in appreciable quantities, will ignite, with a succession of flashes, on the approach of flame.

"The thermometer should not descend far below the surface of the oil; if the bulb is well covered it is sufficient. It is well to stir the oil before applying the flame, which should not be thrust against the oil, but should be flitted quickly across the surface after noting the thermometer. The oil should be heated very slowly; a test should never be completed in less than fifteen minutes, and when the oil flashes or burns but a few degrees from the standard temperature, it is hardly safe to spend less than twenty-five to forty minutes in raising the temperature of the oil to the flashing point."

A rude and not very reliable test, but one which is still better than none, is to place some of the oil in an ordinary saucer, which may be floated on the top of water in a pan set upon a stove, with a thermometer in the water. The flame may be applied in the manner described.

One very simple test may be tried by any one. It is to pour a few drops of the oil into a saucer and apply a match; if the oil takes fire at once, *it is unsafe.* "*The fact that the material can be ignited at the ordinary temperature of a dwelling-house* should be a sufficient evidence, to a person of

intelligence, that when employed in the household, for lighting purposes, it may, at the first thoughtless or careless act, become the cause of awful accidents."—*Dr. Wahl's Report on Kerosene to the Board of Underwriters.*

While it would not necessarily follow, from the test just mentioned, that an oil which does not ignite is a safe one (because the temperature in lamps is always greater than that of the atmosphere), *it may safely be assumed that an oil which does ignite is unsafe*, and there is no need to carry the experiment farther.

The fact that certain highly dangerous oils or naphthas will burn quickly, without explosion, when an unprincipled vendor unscrews the wick-tube of a lamp and applies a match, must not be taken as any evidence of safety. *A certain ratio of air to vapor is necessary to make an explosion.* The maximum degree of violence results from a proportion of eight or nine parts air to one of vapor. The vendor takes advantage of this fact when he practises the sham test just mentioned; *the proportion of vapor to air is too great to explode*, and it burns quietly.

If he should place a small quantity of the same oil in a tin can and shake it thoroughly, a sufficient quantity of vapor would probably be evolved to form an explosive mixture with the air in the can, and the result would be very different!

Petroleum lubricators should not evolve an inflammable vapor below 300°.

Any caution to those who make tests of kerosene to be careful *and not endanger property by the very act which is intended to secure it*, would seem to be superfluous if a gentleman in New Bedford, in carelessly trying a fire test on a sample of kerosene, had not burned up a refinery—oil, barrels, still and buildings!

Recipes for making oils safe.—"Processes have been patented," says Prof. Chandler, "and vendors have sold rights throughout the country of patented and secret processes for rendering gasolene, naphtha and benzine non-explosive. Thus treated, these explosive oils—*just as explosive as before the treatment*—are sold under trade names indicating safety."

"*It is not possible to make gasolene, naphtha or benzine*

safe by any addition that can be made to it. Nor is any oil safe that can be set on fire at the ordinary temperature of the air."

"Safety" lamps, cans, etc. "An indefinite number of 'safety' lamps have also been patented with a view to make it possible to burn explosive naphthas without danger; but the accident, *which is always more likely to occur outside than within the lamp*, is just as liable to take place. The lamp is dropped or broken; it is filled while burning; the servant neglects to screw in the wick tube; the oil is upset or left uncorked, or the servant *uses it to kindle the fire.* In some way or other, fire gets to the vapor of the oil, and an explosion occurs. Even when the 'safety lamp' has an ally in the form of a 'safety can,' it still fails to make naphtha safe. It is an axiom that *no lamp is safe* with *dangerous* oil, and *any lamp is safe with safe oil.*"

Empty Kerosene, Naphtha or Gasolene Barrels are sometimes productive of fires, in consequence of carelessness in approaching them with lights. They are, nearly always, full of explosive vapor, especially after standing in a warm place or in the sun, and have been known to explode with great violence.

Dealers are generally so careless with respect to empty oil barrels, that they should be cautioned by agents as to the danger of approaching them with lights or matches.

Gasolene Gas Machines. The lighting of buildings with gas manufactured by simply passing a current of air through gasolene, so as to evolve a vapor which rises very readily from it, has now become so general as to deserve careful and extended notice. Neither mechanical disturbance of the material nor the application of heat is necessary. The air itself readily takes up the vapor, and the gas resulting becomes merely a mechanical mixture, not a chemical union.

When the apparatus is safely arranged, the lighting of buildings in this manner may be safer than by movable kerosene lamps, but there are many unsafe gas machines, the owners of which deceive property holders and insurance agents with statements that their particular machines have been "approved by the underwriters." Every agent, therefore, should be thoroughly informed, so as to judge for himself as to whether a machine

is safe or not, and as to whether the position in which it is placed, and the manner in which it is used, will justify his approval.

Gasolene gas or naphtha gas is simple a mixture of common air and gasolene vapor, in such proportions as to make it burn. The machinery usually consists of a metal tank or receiver, for holding the liquid, and an air-pump or "blower" to supply it with air. The tank should be under ground, from thirty to fifty feet distant from the building to be lighted, if it is a dwelling, and from fifty to seventy-five feet distant, if it is a hotel, manufactory or other large building, requiring a greater number of burners. The aim should always be to mingle at such temperature that *it will not separate or condense afterward*, especially at ordinary temperatures, as the tendency of the mixture—particularly when the fire-heat is applied to make the liquid vaporize—is to condense in the pipes at any temperature materially lower than that at which it is generated, for which reason *no artificial heat should be permitted.*

The receiver should be lower than the air-pump or "blower" and the pipes throughout the building *should be inclined, so that any condensation will flow outside of the building and back into the tank or receiver.* Where the tank is lower than the building it is impossible for any of the liquid to flow into the building; and when a considerable distance intervenes between the tank and the building a further advantage is secured, the pipe passing under ground being cool, the gas is more likely to condense before it reaches the building, and a safer gas—one which is not likely to condense in the temperature of the building—enters the pipes.

The air-pump, "blower" or "meter," for forcing air into the gasolene tank, usually works by clock-work, the motive power being a suspended weight. As the air-pump requires frequent attention, and contains water which must not be allowed to freeze, and as it should be in a dry place, where the moving parts may not be injured by rust, some builders claim that it is necessary to permit it to be placed in the cellar of the building; but as furnaces are usually located in cellars, there would be a liability to great danger, if any of the gas should escape from the pump or blower into the cellar. The gas being heavier than the air, owing to the preponderance of carbon, is very liable to

ignite at the furnaces and cause explosion and fire. For this reason the supply of air to the pump should, in all cases, be taken by an induction pipe *from the outside of the building*, so in case of any change of pressure, by which the gas in the tank should happen to be forced back into the air-pump and through the induction pipe, it may not enter the cellar (as would be the case if the induction pipe opened into the cellar), but pass off into the outer air.

The gas of the tank may be forced back into the air-pump if the filling of the tank with gasolene is not properly done; as, for instance, where the vent cock is not opened during the process of filling from the barrel, the pressure of the entering fluid would force the gas through the pipe leading to the blower.

In this way the Cashier of the Continental Insurance Company lost his dwelling-house and its contents. The air-pump took its supply of air from the *inside or cellar of the building*; and as he neglected to open the vent cock, while filling the tank, gas was forced through the air-pump and induction pipe into the cellar. A servant, entering the cellar a few moments afterwards, with a lighted candle, caused an explosion which fatally burned her and destroyed the building and furniture. The fire was peculiarly rapid, preventing the saving of anything of value.

The most approved gas apparatus now used has a vent cock so constructed that the cock for filling cannot be opened *without opening both* and is "fool-proof."

There should be a cut-off stop-cock in the gas pipe, at the building, to cut off the tank from the house, if occasion should require it.

It would seem unnecessary to add that all of the apparatus—tank, air-pump and pipes—should be made of the best materials and in the best manner. All of the pipes should be tested, by competent experts, before the gas is let on.

Particular inquiry should be made as to whether the person entrusted with the filling of the tank is informed as to the importance of having the vent open and the air-pump shut off before commencing to fill the tank, and as to the general danger of using a light in or near the gas-house or vault.

No barrels containing any of the materials should be per-

mitted in or near insured buildings, and no empty gasolene barrels should be permitted near them, on account of the dangerous gas which such barrels always contain, as before explained. It is claimed that a pint of gasolene will impregnate and make explosive 200 cubic feet of air. As we have elsewhere stated, it depends only upon the proportions in which gasolene vapor and air are mixed (page 159) as to whether the result is a *burning gas* or *explosive vapor*. If the air is thoroughly carburetted it burns quietly; but if not, it explodes. For this reason the vapor found in empty barrels is nearly always a highly explosive one.

Gasolene Stoves, now frequently used in tin-shops for heating soldering irons, and in other risks for cooking, heating, and other purposes, must not be permitted by agents without the consent of the company and according to National Board precautions and rules. The danger of these stoves is not so much from the mere process of burning gasolene vapor as from the *presence in a building of the material itself*, and the dangers inseparable from the handling of it. It is more dangerous than gunpowder, as the latter will not seek flame or fire, while the vapor of gasolene will, and parties who handle the material grow careless. All receptacles are liable to leak, and, even in the hands of the most careful person, the filling of the receiver is attended with danger.

If such stoves are ever safe it is only where the receptacle for the gasolene is *outside of the building*, and the gasolene introduced to the stove by a pipe running through the wall. The material must not be stored in or near the insured buildings, except as described in the small quantity for the use of the stoves.

As I write, a California journal contains accounts of two gasolene fires which illustrate the danger of having the material about. A fire occurred in Los Angeles, Cal. Gasolene was actually drawn in a pitcher and left standing upon a kitchen table. Another member of the household, discovering the pitcher and supposing it to hold water, actually poured it into a tea kettle, which was over a burning gas jet on a gasolene stove. The result is said to have been instantaneous!

The second fire occurred in another California house, where a cup of the fluid was left standing on a table; a match lighted

in its vicinity set fire to the gasolene, causing an explosion, resulting in a loss of over four hundred dollars.

STEAM-PIPES AND THEIR DANGER.

This is a subject to which we desire particularly to call your attention. It has, at last, become a serious question whether stoves—because of their admitted danger and the consequent care in their management—are not safer than steam-pipes, where the manufacturer entertains doubts as to the ignition of wood by them when in contact with it. Unfortunately the causes of many fires are never discovered. All traces are lost in the ruin which follows the conflagration; but sufficient statistics of well authenticated cases of fires from steam-pipes have been secured to convince the most skeptical on this point. We give a list of some of them, in the hope that our pains may not be without reward. It must be borne in mind, however, that it is difficult to catch such a dangerous incendiary "red handed in the act." Our list might be larger.

E. M. Williams' Woolen Mill at Yantic, Conn., from wool in contact with steam coil. Loss $8,500.

Jones & Loughlins' American Iron Works at Pittsburgh, Pa., Fire in a wooden box containing a steam-pipe packed in sawdust. A clear case—discovered in the daytime.

Briggs House, Chicago Steam pipes in drying room of laundry in contact with wood. Discovered and extinguished.

Store of Wm. H. Watson, cor. Park Place and Church Street, New York, Steam-heating pipes.

Dwelling House of Beach Vanderpool, Esq., in Washington Place, Newark, N. J. Steam-heating pipes in a wood-box. Discovered and extinguished in the daytime. A clear case. This was a first-class, brick dwelling costing $75,000.

Utica Steam Cotton Co., Utica, N. Y. Fire discovered running over two laps of cotton in contact with steam-pipes. A clear case of the ignition of *clean cotton*.

Republican News Office, Geo. Knapp & Co., S. E. cor. Third and Chestnut Streets, St. Louis, Mo. Main pipe leading to top of building.

Oneco Mills, Sterling, Conn. Steam-pipe packed in charcoal.

Pacific Mills, in wool sorting room, from placing fleeces over steam-pipes to warm for opening.

Lonsdale Mill, R. I. Steam-pipe packed in sawdust. Box on fire a number of times.

Androscoggin Mills. From oily overalls hung to dry over steam-pipes.

St. Nicholas Hotel, New York. Woodwork in contact with steam-pipes. Discovered before loss.

Metropolitan Hotel, New York. Woodwork in contact with pipes.

Robertson Paper Co., Bellows Falls, Vt. Steam-pipe set fire to wooden casing in which it was enclosed.

Higgins Carpet Co. The superintendent of the Higgins Carpet Company's Mills, in New York, told me that he saw, one day, a collection of flyings on top of the steam-pipes which ran along the side walls burst into flame from the heat of the pipes and run the whole length of the piping. The fire occurred while the men were out of the mill, during the dinner hour, and but for the fact that he happened to be in the mill at the time there would have been a disastrous conflagration.

It will be seen that several fires occurred from the use of charcoal, sawdust, etc., for packing to prevent loss of steam by radiation and condensation. These substances *are not safe for the purpose.* Prof. Tyndall recommended powdered gypsum as a safe, inexpensive and equally efficacious substitute.

A fire was discovered in the mill of Mr. Eddy of Fall River, and its fortunate extinction may serve to convince manufacturers of a danger from steam-pipes not before thought of.

The gentleman in question had placed a pine board in his wool-drying room, about three or four inches above the steam-pipes, to prevent wool from falling on them. A fire ensued, causing a loss of several thousand dollars before being extinguished, and a careful examination as to its origin satisfied him that the heat of the pipes *had distilled the pitch from several pine knots in the board*, which dropping on the pipes below had caused the combustion.

We need not suggest the lesson of this fire, or the necessity of following steam-pipes throughout their length to see that *where they pass under woodwork—as when suspended below ceilings or floor timbers—they are not so near as to endanger the mill* in the manner above described; nor need we add that the general use of the Southern or yellow pine in the flooring or girders of buildings (the knots of which yield their pitch to a very moderate heat) will justify a thorough scrutiny of the woodwork, from time to time, to guard against fire.

The well-known tendency of lumps of charcoal to take fire

spontaneously if moistened and then subjected to a slight drying heat, (less than that of boiling water), suggests another way in which steam-pipes may set fire to wood. We give an interesting account of an experiment by Professor C. T. Jackson (the well-known discoverer of etherization) in his own words. Not less interesting than the narrative is his very clear explanation of the phenomenon and its cause:

"Three times," he says, "I have set fire to charcoal *at temperatures below that of boiling water.* My first experiment or observation was accidental. I was preparing, while at Bangor, Me., for a lecture, in which I had occasion to show an artificial volcano. I took a tray filled with gunpowder and laid it on the stove to dry. I then took a paper of pulverized charcoal, such as is sold by the apothecaries for tooth-powder, the charcoal being wrapped in white paper, and placed it on the top of the gunpowder which was being dried upon the stove. Having occasion to go out, I took off the paper of charcoal and laid it on the table. When I came back in about twenty minutes, I observed the paper smoking. The charcoal was completely consumed. During all this time the gunpowder remained on the stove unexploded.

"My next observation was this: While at work in my laboratory, I had occasion to use a piece of charcoal for blow-pipe experiments. I went down into my cellar and brought up a piece of light, fine, round charcoal, suited for that purpose. It was damp. I laid it on the top of a column stove to dry, directly beside a tin pan containing water, which was not boiling, and never did boil there. I took the charcoal off the stove and laid it on my table. A short time afterward, I discovered that it was on fire all through the piece. I laid it aside, and it burned entirely to ashes. The theory of the ignition of the charcoal under these circumstances struck me at once. Charcoal has wonderful porosity: it has the power of analyzing air, and absorbing the oxygen with comparatively little of its nitrogen. The pores of the charcoal were previously filled with moisture. Drying expelled this moisture. The oxygen of the air was condensed in the charcoal, taking the place of the moisture. The condensation of the oxygen produced sufficient heat to ignite the charcoal. I repeated this experiment again intentionally, watching it carefully, and with the same result."

I have never found any manufacturer or practical mechanic who denied that steam-pipes would *reduce wood to a condition of charcoal*—all admit this. The wooden covering or "lagging" of engine cylinders after a few years of service, or any other wood in contact with steam-pipes for a sufficient length of time, will give evidence enough in proof of this if examined. It is needless to suggest the numerous ways in which these charred surfaces may become moistened and reduced to precisely the same conditions as the charcoal in the experiment described, after which the pipes themselves supply the requisite degree of heat to fulfil all the conditions necessary to produce combustion.

The writer some years ago was inspecting the Conestoga Mills at Lancaster, Pa. The superintendent, a very intelligent man, combated the theory of ignition by steam-pipes, and insisted on a visit to the engine-room, to observe the charred wood lagging of the steam-cylinder of his engine, which he said had been on the engine for years and had been reduced almost entirely to charcoal and had not ignited. I related this incident of Professor Jackson, and suggested that the dryness of the lagging might really be the explanation of its failure to ignite, explaining that, in the case of floors, where the steam-pipe always reduces the interior of the planking to charcoal which afterwards might become damp from washing the floors, and so present exactly the conditions of the damp charcoal undergoing the drying process in Professor Jackson's experiment, there might not be the same immunity from ignition. I also urged the Eddy incident as explaining another class of steam-pipe fires and the danger of a horizontal pipe running through his weave room just under yellow pine girders.

He listened with great interest and, with that promptness which characterizes fair-minded men when they become convinced, accepted the explanation as a good one and ordered the girders protected by tin wherever they passed over steam-pipes, and the flooring cut around steam risers.

I do not regard the practice of covering steam-cylinders with wooden lagging as safe, but I presume I should be regarded as radical by nine so-called practical men out of ten, among mechanics, if I should presume to suggest any correction of the practice.

Steam-pipes are particularly dangerous *where they pass, for any distance, out of sight between floors or through hollow plastered partitions.* The tendency of rats and mice to build their nests near them, on account of the warmth they afford, is well known, and they are, for this reason, often in actual contact with the most dangerous rubbish, such as oily or greasy rags, cotton or woolen waste, occasioning fires whose origin is never known. In such cases the steam-pipes, if they do not actually ignite the combustible material, become, it must be conceded, the direct promoters of spontaneous combustion. They should, if for this reason alone, be always in plain sight and exposed to view throughout the mill, and where they pass through floors should be protected by metal thimbles or flanges, the inner rim of which should be furnished with points to admit of a constant current of air.

Steam-pipes have been known to set fire to wood at a distance of three hundred feet from the boiler. Hot water pipes were claimed by Mr. Braidwood, of the London Fire Brigade, to be dangerous if in contact with wood, as early as 1846. The argument that the temperature of boiling water is only 212°, and, therefore, not hot enough to ignite wood, falls to the ground in view of the fact that when pipes are carried to a height of sixty or seventy feet, as in the case of large buildings, the water of the boilers is under a pressure of *two or three atmospheres instead of one* and the boiling point may be above 212°.

The reduction in the number of steam-pipes fires in manufactories of late years is due to the observation of precautions which underwriters have carefully pointed out as necessary. Chief among which is the running of pipes near ceilings where stock cannot touch them. They warm rooms better than when near the floor.

N. B. See possible explanation of steam-pipe fires, p. 142.

LIGHTNING.

Lightning causes many fires, which could be prevented by good lightning-rods, extending into moist ground or into the water of wells. The inspector should carefully examine a building to see that rods have sufficiently numerous points and are connected with soldered joints and *properly grounded.* Claims for losses are rare on buildings properly rodded.

Probably no consideration connected with dwelling-houses, especially, is the subject of greater diversity of opinion than that of whether or not lightning-rods are necessary. That it is advisable to have a good lightning-rod, well grounded, i. e., *connected with moist ground*, is the generally accepted opinion of those who ought to be best informed on the subject. I am fully aware that lightning-rods are regarded by a large number of people as affording no protection; indeed, a gentleman who has favored me with many valuable suggestions, insists that a dwelling of his, destroyed by fire in consequence of being struck by lightning, was rodded in the best manner. Notwithstanding his opinion, I advise every one to have a good lightning-rod, and to supplement its protection with a fire-insurance policy in a reliable insurance company. The Washington monument was repeatedly struck and injured until it had been protected with a rod, and though repeatedly struck afterward, no damage was done.

The large chimney, surrounded by staging, of the West Boylston Manufacturing Company, at East Hampton Mass., while in process of building was struck by lightning on July 14, 1900. It was claimed that the wire cable for hoisting material and laborers to the top of the chimney acted as a lightning-rod and accounted for the small amount of damage. This could not have been the case, however, as the cable was not connected by any conductor to moist soil so as to secure a good ground.

The advantage of lightning-rods, it should be remembered, is not restricted to the conducting away of strokes of lightning. Their principal office is to tap the electricity in the atmosphere so to speak, and conduct it quietly away to the ground, *preventing its accumulation in sufficient volume for a stroke.* For this reason the lightning-rod should have numerous points on the roof. It is a well-known fact that beech-trees are seldom struck by lightning, whereas oaks, hemlocks, and other trees, especially locusts, are subject to frequent damage; and while this well-known fact is accounted for on the supposition that the rougher barks hold water, itself a good conductor, and that oak contains a great deal of iron in its composition, the exemption of the beech-tree is believed by many to be due to the fact that it has numerous pointed leaves and twigs, as well as a smooth bark.

The lightning-rod may be of iron or copper, and may be in the simple form of a hollow gas-pipe or in twisted wire cables, or it may be in a flat or taped surface. It is the surface which conducts the electricity, rather than the center or solid portion of the rod.

Houses and barns should be protected by good rods, with numerous points of bright polished metal on the highest points of the roofs. As a rule a pointed rod protects as much of the surface of a roof as would be swept by a radius or line four times the height of the rod above the roof, showing the necessity of numerous points.

Iron is almost as good as copper as a conductor, and an ordinary gas-pipe $\frac{3}{4}$ inch in diameter makes a good rod. *Four or five strands of ordinary barbed wire for fencing, twisted together, would make a good lightning-rod and an economical one. Care should be taken to have the strands unbroken*, however, as it would not be sufficient to twist ends together or join them by laps unless they were soldered; each strand should be continuous from the roof to the "ground" in moist earth. Points may be made by filing the ends of the wire with a file, on the roof ridges and at all prominent places, tops of chimneys, etc. A sufficient number of such barbed wire rods would be all that would be necessary to protect buildings, and any farmer can make them for himself. In the absence of barbed wire, which would be apt by its points to hold its place on the roof, especially with staples, driven into the shingles or siding, three or four strands of quarter inch iron wire, twisted together, would make an admirable rod, care being taken to file the ends to sharp points where they project above the roofs or chimneys. *It is vitally important, however, that the rod should go far enough into the ground to reach damp earth.* Where this is difficult to find, an artificial ground may be made by filling the bottom of the hole in which the foot of the rod enters with a bushel or two of good charcoal. One of the best grounds is to attach the rod to the pump rod in the well, so that there may be a continuous metal conductor from the highest point of the roof to the bottom of the well.

The rod may be fastened to the roof and sides of the building with ordinary iron staples. *It is not necessary to use glass*

insulators, as lightning will not leave the metal rod to enter the poorer conductor of the wooden structure.

It is entirely unnecessary to buy some of the patent rods on the market, which are sold at fancy prices. As already stated, a $^3/_4$ inch gas pipe, or a rod of copper wire one-quarter of an inch in diameter, or simple barbed wire, with the points sharpened makes a good conductor.

Where contracts are made with itinerant lightning-rod venders, care should be taken as to the form of notes and contracts for signature. Gross frauds have been practiced upon unsuspicious men by unscrupulous parties, and the innocent victims have learned, when notes have been presented for collection, or bills presented for signed contracts, that alterations in the text have been made after the signature has been affixed, and that the terms of the contract have not been fully and honestly explained.

The writer would advise all persons erecting dwellings in isolated locations to have rods. In cities they are not necessary, due to the use of tin or other metal for roofs, water-pipes connected with the underground system of the city, or with drain-pipes which are sufficiently good conductors to make rods unnecessary. Indeed, even in country dwellings, if leaders and gutters are connected with the points of the rod on the roof, they form sufficient channels for carrying the electricity or lightning to the ground, *provided they are connected with moist ground or with the pump-rod in the well.*

A poor rod, or one not properly connected with moist ground, or disconnected at points, is worse than none.

Lightning is less dangerous in cities, where as already stated, the numerous metal roofs and connections of metal in the shape of piping, gutters, leaders, &c., with underground systems of pipes conduct away the electricity, and it will be found that only one per cent in number of losses on buildings in cities are due to lightning, and two per cent of the amount of insurance; whereas on farm property, 11 $^1/_2$% of the total number of losses on buildings, are due to lightning, the aggregate loss being 8% of the total amount paid from all causes. On live stock, 25% of the number of losses are due to lightning, and 8% of the total amount of losses paid from all causes.

APPLIANCES FOR EXTINGUISHING FIRE, CITY FIRE DEPARTMENTS, ETC.

Every building should be provided with fire-extinguishing appliances of its own in proportion to its area and height. The best fire appliances, strange as it may seem, are the cheapest—pails filled with water ready at the head of every staircase, and for the reason that everyone knows how to use a pail of water, while the average person, especially in the hour of excitement, and danger does not understand patent fire-extinguishing appliances and might not know how to turn on the valve of a standpipe and bring the hose into action. Even in manufactories, where cool-headed mechanics might be supposed competent to handle fire apparatus, more than sixty-five per cent of all the fires are extinguished by pails of water. Underwriters should therefore, regard these simple but effective appliances favorably in making rates, which should, in all cases, be 5% lower where they are provided, at the rate of say six pails to every 2,500 square feet of superficial area or floor surface. A little salt added to the water will prevent its freezing and tissue paper over the top will prevent rapid evaporation and accumulations of dust. Salt in metal pails, however, will corrode them. It is claimed that Calcium Chloride will prevent freezing and will not cause rust.

Standpipes should be provided, with Siamese or double connections for the use of fire engines at the street, with hose outlets also at each window, to save the carrying of hose upstairs; and internal standpipes should be provided in all high buildings, supplied with tanks on the roof, but these latter should, as already explained, be supported on iron beams and rest in a corner of the building where two brick enclosing walls will form the basis of support.

Public Fire Departments and city fire appliances should be recognized, of course, in all rating systems.

The best system of water supply is one where the water is under sufficient pressure at the hydrant to throw over the highest buildings without the use of a steam pump or steam fire engine; in other words, where the pressure is a gravity pressure. This can only be secured where an elevation of at least two hundred feet in height can be had for a reservoir sufficiently neai to a city to prevent the loss of pressure by the "frictional head" in the pipes. Where this is not possible, as explained in the article on water supply, direct pumping systems are desirable, though not so good.

Theoretically, a first-class steam fire engine is supposed to throw one thousand gallons of water per minute, but the average water discharged would probably be nearer seven hundred gallons per minute. Even with the heaviest and best engines of the Silsby, La France or other makes, it is best to count upon this quantity, rather than upon the maximum theoretical value of the engine.

The whole subject of fire engines, hook and ladder trucks, chemical extinguishers, gravity water supply, direct pumping systems, &c., is treated of under the Universal Schedule, and their relative value is measured by the deductions allowed for each.

Paid fire departments are, of course, superior to volunteer organizations, but the firemen should not be paid according to the number of fires they attend—a dangerous method of compensation. The chief should be a competent fireman, enjoying the confidence of his force.

Mr. Braidwood, who was, for many years, the superintendent of the London Fire Brigade, until his death in the great fire of the London Warehouses, on Cotton's Wharf, in 1861, in an interesting and instructive work on the extinction of fires, says:

"It is now generally admitted that the whole force brought together to extinguish a fire should be under the direction of *one individual*. By this means all quarreling among the firemen about the supply of water, the interest of particular companies and other matters of detail, is avoided. It is quite obvious that a fire brigade, however complete in its apparatus and equipments, *must depend for its efficiency on the state of training and discipline of the firemen.* Wherever there

is inexperience, want of co-operation, or confusion amongst them, the utmost danger is to be apprehended in the event of fire. It is amidst the raging of this destructive element, the terror and bustle of the inhabitants, that organization and discipline triumph; and it is then, too, that coolness and promptitude, steadiness and activity, fearlessness and caution are peculiarly required; but, unfortunately, it is then, also, that they are most rarely exhibited." He adds, "On no account whatever should directions be given to the firemen by any other individual while the superintendent of brigade is present"—a most important matter.

The importance of permanence in the positions of Chief and Assistant Engineers of fire departments was a topic considered at the convention of Chief Engineers, held in New York, in October, 1875. It was premised that "these officers are entitled to no permanency except that which their merits and ability as firemen and leaders of firemen entitle them to," but that "permanency in such offices is essential to proper discipline in the force and to secure the advantages of education and experience. The greatest evils result from the uncertainty of tenure of such offices and the influences under which officers are appointed to, or dismissed from office. If party fealty and efficiency are to be regarded as tests of merit, *the least efficient fireman in the department, or any one out of it, may hope in that line to rival and supplant the Chief!*"

When men, ever so well qualified, are placed under an incompetent and inexperienced leader, they are, in emergencies, well-nigh helpless and useless. "Under such circumstances it will often be the case that private members will possess more knowledge of the duty to be performed than their superiors have, which inevitably tends to disrespect and a lack of proper subordination."

It was remarked by the first Napoleon, when speaking of Marshal Ney, "better an army of deer commanded by a lion, than an army of lions commanded by a deer!"

The whole general force of a city should realize that their position will be permanent during good behavior and efficiency.

AUTOMATIC SPRINKLERS.

It is not necessary in this place, nor would it be wise, to go

into details as to the rules for installing automatic sprinklers. Proper regulations for these valuable appliances are kept up to date by the New England Insurance Exchange, the New York Board of Underwriters, and the National Board of Underwriters, and it would be well to apply through the bureau of underwriters having jurisdiction of the territory in which the building is located, for full specifications. If the property-owner follows these he will avoid serious mistakes, such as are sometimes made even by practical mechanics, as to the size of distributing rising pipes, which should always be proportionate to the number of orifices to be supplied with water. Where they are not of sufficient capacity the system of heads would be of little value.

The sprinkler heads opening on an area of ten thousand square feet would use more water than a powerful steam fire engine would throw, and it is, therefore, important that the riser, main and distributing pipes should be of proper dimensions.

It is also important to put a sprinkler head in every section of the risk. So many fires have passed control owing to the fact that they have started in locations where it was supposed there was the minimum of danger, that the rule, almost paradoxical in its character, has been suggested: "Be sure to put sprinkler heads in those places where you feel certain they will not be needed."

It is important, also, to see that the valves controlling the supply are open and sealed open. Not less than one instance per week is the record of discovery, in mills of New England territory, of neglect of such a vital precaution. The system therefore, should be tested by an insurance inspector, to make certain that the whole installation is not simply on dress parade. In one instance coming to the writer's attention, a mechanic, having occasion to use packing for a flange joint, not having any gasket for the purpose, used a sheet of rubber, but *neglected to cut out the centre.* The water way, therefore, was effectually blocked and the whole system was useless.

All sprinkler systems should be connected by risers with Siamese connections at the street, so that the fire department can attach a steam fire engine and supply water after the tank

is exhausted. This is a very important matter, for it insures that the water thrown by the fire department will reach exactly the spot where it is most needed, it being safe to assume that the sprinkler heads would be open where the fire is burning. It would be well to have a check valve at the tank, so that the pressure may be thrown directly upon the system of sprinkler heads from the engine. In such case, as already stated, the coupling and thread should correspond with that of the fire department; and to make sure that it does it would be well to ask the foreman of the nearest engine company to test his hose coupling with the Siamese connection. The fire department should be informed as to the location of the connection, and it should be the task of the underwriter to make sure that the chief of the department and the various captains and foremen of the companies believe in this important precaution of at once coupling on the sprinkler system. Some of the chiefs have not recognized the importance of taking this action, but the more intelligent officials are now fully convinced that it should not be neglected in any case.

The following is a brief synopsis of the requirements of the New England Insurance Exchange, the New York Board of Underwriters and other organizations as to the installation of sprinklers:

It is probably unnecessary to explain that an automatic sprinkler is a device for distributing water, having a valve arranged to open when any rise of temperature, as from a fire, shall melt the fusible metal which solders the joints, just as wax would while cold, hold two surfaces in contact, but release them so soon as warmed by heat. The soluble solder used in sprinklers is adjusted for various temperatures according to the character of occupancy of the building which they are expected to protect.

The underlying principles to secure the best results are:

1. Open construction; freedom from concealed spaces or places where water thrown from sprinklers cannot penetrate. It is obvious that sprinklers would not throw water into closed drawers, under counters, &c. The distribution, moreover, would not be as satisfactory in a warehouse full of empty barrels as in the case of a store where all of the goods were displayed on open tables,

2. Sprinklers should be so located that their distribution will cover all parts of the premises. As already stated, they should be placed in those portions where they are supposed not to be needed, as well as all others.

3. The piping must be of sufficient capacity. Where the riser pipe and distributing mains are not sufficient to supply the heads, the system is, of course, of little value.

4. The water must be under pressure at all times, except in case of buildings where there is danger of its freezing, in which case the dry pipe system is to be used.

5. There should be two sources of water supply: (1) a tank sufficiently elevated to afford pressure, and (2) a supply by a force pump, or by the city department.

Siamese connections at the street, for the use of fire department, to attach engines on the system, are imperatively necessary.

LOCATION AND ARRANGEMENT OF SPRINKLERS.

Sprinklers should be located preferably in an upright position on top of pipes.

Deflectors must in all cases be *parallel* to ceilings, roofs or the incline of stairs. The deflectors of sprinklers in the peak of a pitch roof should be horizontal.

The distance of deflectors from ceilings or bottom of joists should not be less than three inches nor more than ten inches.

Sprinklers should be placed in closets, basements, lofts, elevator wells, under stairs, and, as already stated, at every point where a fire could burn. Special instructions should be obtained relative to placing sprinklers under large shelves, benches, tables, overhead storage racks and platforms, and inside such small enclosures as drying and heating boxes, caul boxes, tenter and dry room enclosures, chutes and cupboards; also over all shafting and gears, even in wet basements, and in boiler rooms, especially if steam fire pump depends on said boilers for its steam supply. Sprinklers should not be omitted in any room simply because it is damp or wet.

Not more than six sprinklers should be placed on *one*

branch line of pipe, except under special regulations as to pipe sizes.

Each automatic sprinkler should have an unobstructed outlet of such size and form that with five pounds pressure maintained at the sprinkler it would discharge approximately twelve gallons per minute.

FEED MAINS AND RISERS.

"Center Central" or "Side Central" feed to sprinklers is recommended; the former preferred, especially if there are more than six sprinklers on a branch line. End feed should not be used.

There must be a separate riser in each building, and in each section of a building divided by fire walls; the size of such riser to be sufficient to supply all the sprinklers on any one floor as determined by the standard schedule of pipe sizes. If the conditions warrant, special permission will be granted allowing the sprinklers in a fire section of *small area* to be fed from the riser in another section.

Where there are enough sprinklers in a room to require a six-inch riser, according to schedule, it is preferable to have these sprinklers supplied through two or more smaller risers (not overlooking the rules as to capacity of pipes —one six-inch pipe will throw more water than two three-inch pipes.)

A belt, stair or elevator tower, having floor openings without "shut offs," is to be treated as one room, and pipe sizes arranged accordingly; sprinklers to be on a separate riser, with independent shut-off and drip valve.

Circulation of water in sprinkler pipes is very objectionable, owing to greatly increased corrosion, deposit of sediment and condensation drip from pipes. For this reason the pipes of a sprinkler system should not be used for domestic or other service.

Hand hose, for fire purposes only, may be attached to sprinkler pipes within a room under the following restrictions:

Hose not to be larger than three-quarter inch.

Nozzle not to be larger than three-eighths inch.

Hose not to be connected to any sprinkler pipe smaller than

$2\frac{1}{2}$-inch; *but hose should not be attached to a dry-pipe system.*

Spacing of Sprinklers should be in accordance with National Board specifications.

Uniform Thread and Dimensions of Hose-Couplings.—The dimensions recommended by the National Association of Fire Engineers are as follows: *inside* diameter of couplings $2\frac{5}{8}$ inches in the clear; *outside*, $3\frac{1}{4}$ inches, exclusive of thread, and, including the thread, $3\frac{3}{8}$ inches. The number of threads to the inch to be *eight*.

The same dimensions should be followed by all mills and manufactories relying upon the co-operation of the nearest city or village department in case of fire. It has frequently happened that such auxiliary aid has been valueless, simply because hose and hydrant threads would not fit those of the department, and reducing or expanding couplings had not been provided to remedy the fault.

The same difficulty would exist, in case of an emergency in a town requiring the assistance of a neighboring city, unless a uniformity existed as to the size of hose couplings and threads.

As early as 1830, Mr. Braidwood, suggested that, if uniformity in the structure and design of apparatus could extend to the most minute particulars, "a screw or nut of any one engine would fit every other engine in the kingdom."

SUBSCRIPTIONS TO FIRE APPARATUS.

It is the rule of insurance companies to decline all applications for the support of fire patrols, as well as for the support of fire departments and organizations of that character, for the simple reason that, as underwriters, we pay the full value of all fire departments, fire patrols, waterworks, &c., in the reduction of rates.

In the case of fire patrols we actually pay three times over what we subscribe:

1st—In the cost of outfit and maintenance.

2d—The property-holder who intelligently observes the efficiency of the patrol very intelligently estimates the probable amount of salvage, and carries a correspondingly small amount

of insurance. In this way we pay by reason of the lower contribution in case of partial losses.

3d—The insurance companies, taking studiously into account the probable salvage on stock by the fire patrol, underbid each other in the rate.

We do not, in any way, disapprove of fire patrols or fire departments, but simply contend that, as underwriters, the full benefit of the patrol is recognized by us in the rate of premium charged. There can be no question that a fire patrol saves money in case of fire, but this saving is in the interest of the assured, who secures the salvage himself by carrying a smaller amount of insurance and thus discounting all the advantages of the patrol.

If all citizens insured their property to its full value and paid underwriters a full rate, without reduction because of fire departments, there might be some excuse for taxing insurance companies for their support; but where rates are reduced because of extinguishing facilities exactly in proportion as they are efficient, and when property-owners reduce the amount of insurance carried by them in the same proportion, some citizens declining to insure at all, surely it is hard to see why underwriters should be taxed on the lower premiums received by them on only a small percentage of the values at risk.

We must, therefore, decline all applications to subscribe for fire departments, believing that our agents will readily see the justice of our reason.

On the basis of sympathy, the officers of the company have no right to give away money which does not belong to them; and on a business basis, they have already paid for the fire department in their rates of premium. So insurance companies may claim, with propriety, that it is a matter of little moment to them whether there is a fire department or not, if only they have knowledge of the facts, their rates being graded according to means provided for extinguishing fire. If our agents, hereafter, are urged to forward appeals for pecuniary aid to fire departments, no matter of what character, we trust they will explain the matter to those who solicit subscriptions, and save us the trouble of doing so.

RATES.

A vitally important subject, upon which the safety of companies and, indirectly, the security of those insured by them depends.

About twenty-five years ago, I undertook to prepare a schedule for rating mercantile risks. At that time schedule rating was in its infancy; the only schedule which was worthy of the name was the schedule for rating cotton and woolen mills. After working assiduously upon the task I abandoned it, believing it impossible of accomplishment. I realized that a rate for groceries, for example, ought to be different from the rate for exactly the same kind of stock, even in the same kind of building, in another part of the same city, if the exposures or environment were different, and if the street water mains were not of the same size, and if the same facilities for fire extinguishment were not provided, and if the occupancy of other sections of the building were not alike in hazard. I also realized that a risk in one city should differ from the same kind of a risk in another city, not only because of the difference in fire department and water supply, but because of the "lay of the land", whether on level ground or on hillsides—like Lynchburg, Va., and Quebec—or because of the previous fire record of the city, indicating exceptional moral or physical hazard, &c., &c. All of these combinations seemed as unlimited as those of a kaleidoscope. Last of all came the important question of the difference between stocks and buildings, not only because of the relative value of water-throwing facilities, which would injure stocks, while extinguishing a fire, more than they would injure buildings; but because of the problem, apparently incapable of solution, as to the relative difference between the rates on stocks and on the buildings containing them, which should vary with the construction of the building and its fire-extinguishing facilities; there being reason, obviously for a greater difference be-

tween the rate of a stock and its building where the latter is of substantial construction, with the best of fire appliances, than between the same kind of stock and another building, of flimsy construction and with no fire-extinguishing appliances whatever.

During the ensuing twenty-five years, at intervals of every two or three years, getting new light on the subject, I attacked the problem again and again. But it was not until the appointment in 1891 of a committee, known as the "Universal Schedule Committee," of which I was Chairman, and of a number of co-operating committees from the various associations of underwriters throughout the United States, viz., the New England Insurance Exchange, the Underwriters' Association of New York State, the Underwriters' Association of the Middle Department, the Southeastern Tariff Association, the National Board of Fire Underwriters, and the New York Board of Fire Underwriters—a large committee, consisting of thirty-seven members—who sought the advice and criticism of underwriters throughout the United States and Canada, as well as in England, that this important problem was finally satisfactorily dealt with. No one man or, for that matter, no thirty-seven men, could have supplied the knowledge and statistics necessary for the accomplishment of the task.

The result of their work, the "Universal Schedule," has successfully met all adverse criticism, during the years which have elapsed since the Schedule was finally put forth in its present form, but, what is better still, the Schedule has been in successful operation in numerous cities and towns throughout the country—notably those of New York, Boston, Philadelphia, Denver, Cleveland, New Orleans, Scranton, Pittsfield, Albany, San Antonio, and others—and has been, in slightly changed form, but with many of the important principles, incorporated in schedules and tariffs throughout the United States. I commend its careful study to any novice who proposes to make insurance his business, for I am convinced of the correctness of the principles on which the Schedule is founded and which are recognized throughout its entire system. I assert, without fear of contradiction, that a schedule should be formulated upon the following lines, and that it should recognize:

First. A standard of environment—the city.

Second. A standard of construction—the building.

Third. An addition for the ignitibility and combustibility features of occupancy.

Fourth. An addition to all three of these to get the rate of damageable contents; incidentally this latter to be varied in buildings which are not standard, because there should be less difference between the rate of the building and of its contents in the case of buildings of poor construction than in buildings of standard construction.

Fifth. An allowance on both building and stock for exceptional features of fire extinction, proximity to hydrants, engine houses, automatic fire alarms, etc., this being necessary to recognize the obvious difference between two risks of the same construction and occupancy even in the same city.

Further, that a schedule should recognize in its plan of arrangement:

First. A key-rate—as to which various cities and towns differ.

Second. Charges for variations from standards of construction—which ought to be the same everywhere.

Third. Charges for hazards of occupancy—which ought to be the same everywhere.

Fourth. Charges for insuring contents according to their susceptibility to damage—which ought to be the same everywhere.

Fifth. The variation of these charges, according to the construction of the building. Clearly the same amount should not be added, even for the same stock, to two different buildings where one is an exceptionally good building and the other an exceptionally poor one; there should be a greater difference between the building and stock rate in the one case than in the other.

Sixth. The treatment of fire extinguishing facilities, proximity to hydrants, etc., for the particular risk rated, according to circumstances; it being clear that if the risk is within reach of hydrants, steam engines, etc., and on an

eight-inch or larger water main, it should rate differently from another of like kind, even in the same town, if the other risk be not so fortunately located.

Much has been said about the Universal Mercantile Schedule, pro and con. In order to narrow down the discussion to what seem to me vital principles which should be observed in any system of rating, I make the claim that in the following seven of the foregoing vitally important requisites of any schedule the "Universal" stands alone.

First. A schedule should recognize a key-rate as a starting point, viz., the rate of a building of standard construction in a standard environment, i. e., in a city presenting the most favorable conditions for the prevention, discovery, extinction and confinement of fires to single buildings; and the difference between the starting point, or base rate, of one city as compared with another should be explainable by charges for variation from standard. Unless differences between two cities as to the same character of structure are explainable, jealousies and antagonisms will result in adverse legislation.

No other schedule has ever recognized this important feature.

Second. Inasmuch as all the risks of a city cannot have the maximum benefit of the fire department, especially where street water mains are of inadequate sizes, it is clear that all risks in the city should not be rated alike, even though identical in construction and occupancy, but that they should differ, according to the sizes of street mains, proximity to hydrants, fire engine houses, etc., etc.

No other schedule has ever recognized this important feature.

Third. Certain features of construction, like self-releasing floor beams, for instance, which improve a building are of no benefit to the stock. The stock, therefore, should not receive credit for them in the rate. A system of rating by adding some fixed sum to the final building rate to get the stock rate must, by this process which recognizes features that are not of advantage to the stock, result in an inadequate stock rate.

The Universal Schedule is the only schedule which has recognized this important feature.

Fourth. Fire-extinguishing appliances, especially for throwing water, should not receive credit in computing the rates of stocks to the same extent as in computing the rates of buildings, because water damages stocks to a greater extent than buildings.

No other schedule has ever recognized this important feature.

Fifth. Exposures should be treated differently in the case of buildings from stocks. A building may be so constructed as to be a complete protection

to its stock, but require a charge in its own rate for possible damage to its exterior, paint, &c., &c.

No other schedule has ever recognized this important feature. The same exposure charge has always been added to stock and building alike.

Sixth. The rate of a stock should approach that of the building containing it in proportion as the latter is of poor construction, liable to be totally destroyed, and in proportion as it is deficient in fire-extinguishing appliances; whereas there should be a wide difference between the rate of a building and its stock if the building is of standard construction and its fire-extinguishing appliances are of the best. And this difference in rate should never be determined as a matter of judgment, but by some automatic process which will adjust the difference in rate to the conditions. This the Universal Schedule does.

No other schedule has ever provided for this vitally important feature.

Seventh. The fire record of a city should be taken into account in computing rates, both at the beginning and ending of the term for which the rate is computed. The Universal Schedule recognizes this.

No other schedule has ever recognized this important feature.

If, at the end of a given term, the percentage of loss to premium is less than 55%, a reduction of one per cent in rate is made for each one per cent of reduction in percentage; so that if the percentage is reduced to 40, fifteen per cent reduction in rate would be allowed on renewals. Any system of schedule rating which charged for improper construction (and would, therefore, encourage proper construction) and which charged for faults of management (and, therefore, would encourage cleanliness and other conditions which tend to prevent fires) would inevitably result in a reduction of the fire loss, which should be recognized in the rate by some systematic and equitable percentage of reduction. If not so recognized, it will result in rate-cutting and demoralization.

It is not a serious question, in this view, whether the individual, detail charges of a schedule are too high or too low, or whether the schedule itself be too high or too low, since it will be adjusted in this way to a proper basis.

I regard this feature of adjustment to the fire record as one of the most important features of the Universal Schedule, differing from all others. It tends not only to adjust the rate to improved

conditions, but it tends to remove all opposition on the part of the public and of their legislators, since nothing could be fairer as a proposition, when legislation prohibiting comparison of experience and co-operation to ascertain and fix rates is urged, than to be able to say to the legislator and to the property-owner: "Our system of rating is adjusted to a five per cent profit only, and the moment it is found that there is a reduced fire loss our rates will be reduced pro rata."

It is, of course, possible that a careful analysis of the fire losses in proportion to the amount at risk may some day indicate that certain classes are rated too low and others too high. When that time arrives, but not until then, will it be reasonable to change the figures of the susceptibility column in the schedule, and a common-sense view of the business would, until that time arrives, treat the figures in the alphabetical list, as the best for the time being, prepared as they were at such immense labor, as a convenient, nay, indispensable arrangement for recording any valuable discovery worthy of preservation. When the underwriter is discovered who can name a figure for sixteen hundred classes, based upon an intelligent study of a reliable experience of fire cost, and can remember his figures three months together, we shall be prepared to listen with deference to his criticism of the Universal Schedule.

EFFECTS OF CONTENTS ON RISK.

Every class of merchandise, when considered from the viewpoint of its effect upon the building containing it, in the matter of increase of hazard, and also from the viewpoint of its susceptibility to damage by fire, water or smoke—an important matter in estimating the rate for insuring it—should be treated as of threefold character:

First. With reference to its liability to ignite easily. Among the stocks of this character would be furniture, drugs, oils, etc.

Second. With reference to its furnishing fuel for intense combustion, likely to destroy the building and its contents. Stocks illustrating this feature are furniture, woodworking risks, wholesale drugs, etc.

Third. With reference to its own susceptibility to damage

by fire, water and smoke; such stocks as millinery, toys, leaf tobacco, artificial flowers and feathers, wall paper, etc.—a feature which affects only its own rate.

In the Universal Schedule the various stocks are arranged alphabetically, and the figures measuring the first two qualities are entered in the first column, to be added to the building rate to obtain its occupied rate; while in the second column is inserted the figure intended to measure the susceptibility to damage, which is to be added to the *occupied building rate* to obtain the rate for the particular class of goods to be insured.

It would be found, in case of a fire in a building containing a number of different stocks, not totally destroyed, that the salvages on the various classes would bear the same proportion or ratio to each other, that their susceptibility figures, in the second column of the table, bear to each other. For example, the second column for retail groceries is 40 and for dry goods 50, and the salvage would probably be as 4 is to 5.

The old systems of rating, which made all stocks in the same building pay the same rate—and, in all cases, the rate of the worst class—were, therefore, wrong and did injustice to the owner of stocks of less susceptibility. A stock, for example, of sole leather, of crude rubber, of flour in barrels, or of pig lead, should certainly not pay the same rate, though in the same building, as leaf tobacco, millinery, wall paper or German toys.

The list of hazards of the Universal Schedule, alphabetically and numerically arranged (the numbers being intended for ready reference, especially in the analysis statistics of fire cost) embraces not less than 1,600 items, while the Warehouse Schedule, intended to rate each class of merchandise on its merits with regard to its susceptibility to damage, contains not less than 1,200 different kinds of merchandise. It is clear that no single individual, however expert, would be capable of fixing proper rates on so many different risks, nor would his memory be capable of recalling these rates when once fixed. These two considerations support the claim, now universally recognized by rating associations throughout the country, that the list should be kept for reference, and that it is reliable, at least to the extent of showing the *relative* hazards of the different classes.

I most emphatically do not believe in expert off-hand opinions

as to rates, and especially as to that feature of a rate which measures the susceptibility to damage by fire, water and smoke. It is true, as claimed, that an expert in tobacco or in tea or in flour, or in any article of merchandise, becomes by long practice able to determine slight differences in value; but it must be remembered that the insurance expert cannot devote a lifetime to a particular class of merchandise. He cannot know off-hand the value and liability to damage of hundreds, nay, thousands of different articles. Of course, no one man can know much; it is only by canvassing for opinions and fixing the majority view in a printed list that anything approaching accuracy can be secured.

While engaged with my associates in the preparation of the warehouse schedule, which includes over twelve hundred different kinds of merchandise; and in order to demonstrate the inability of any insurance expert to agree with others, or with himself, I asked five gentlemen in New York, who were acknowledged experts in their judgment of city business, to give me their opinions as to what the rate ought to be on about sixty different classes of merchandise to be found in New York warehouses, when contained in a twenty-five-cent building. I venture to say that any one of these gentlemen would be regarded by all of his associates as the equal of any other in the business for just such a task. When the lists were received by me, I arranged them in columns, and found, just what I expected to find, that they differed with each other by considerably more than the percentage of profit realized on the business. In other words, if any one of the five had been taken as standard, the other four differed from him by more than enough to make a profit or a loss. They were much amused over the result, no one, however, knowing what his competitors' figures were, for I had promised to maintain secrecy on this point.

About three months afterward I asked these same five gentlemen if they would not take the lists and give me their opinions again on the same classes of merchandise, assuming correctly that they had forgotten their former figures. I then placed their second set of figures over their first, and found that each differed with himself, after an interval of three months, by an amount which very much more than measured a loss or profit on the classes. In other words, if his figures in the first instance should be taken he would make or lose money by abandoning them for his second.

Here is the list. The figures on line with the class represent the first figure given by each man; the second figure, above it, represents the second attempt:

	A.	B.	C.	D.	E.
	125	100	55	..	..
Acids, sulphuric, muriatic and nitric, in carboys	65	100	55	80	..
	125	100	55	..	..
Acids, oxalic, picric, citric, &c., in bbls	85	100	55	60	..
	60	50	45	50	60
Nuts, almonds, Brazil, hazel, &c., in bbls	55	60	45	..	40
	75	60	50	55	70
Nuts, almonds, Brazil, hazel, &c., in bags	60	..	60	..	..
	75	60	50	75	60
Roots, herbs, leaves and barks, in bbls	65	60	45	60	60
	100	75	50	65	75
Roots, herbs, leaves and barks, in bags and bales	85	75	50	70	75
	90	100	100	100	100
Artificial flowers, in cases	100	100	55	80	100
	60	40	45	40	60
Bacon, in canvas	50	60	40	60	60
	75	100	100	75	100
Baskets, willow	55	100	55	75	100
	65	60	50	60	75
Books, in cases	65	75	50	60	75
	50	50	50	40	50
Boots and shoes, in cases	55	60	50	50	40
	75	60	100	75	75
Champagne, in baskets	65	75	85	50	75
	40	40	50	25	50
China clay, Fuller's earth, terra alba, &c., in bbls	50	60	45	25	40
	60	50	50	40	50
Cloths, cassimeres, &c., in cases	55	60	40	50	50
	50	40	50	40	40
Coffee, in bags	45	60	40	60	40
	150	200	150	150	250
Cotton, in bales	..	200	110	150	150
	75	70	65	60	50
Crockery, in crates	70	75	50	60	40
	60	60	55	60	45
Crockery, in hhds or bbls	55	60	55	50	40
	100	150	50	100	75
Drugs	55	100	85	75	75
	90	75	65	100	100
Druggists' sundries, in cases	65	100	55	70	75
	60	40	50	40	100
Dry goods (except silk), in cases	50	60	40	60	40
	75	60	50	60	75
Silks, in cases	65	60	45	60	50
	45	40	45	40	40
Flour, in bbls	45	60	40	50	40
	60	50	65	60	50
Flour, in bags	55	60	45	60	60

	A.	B.	C.	D.	E.
Fruits, preserved, in jars, bottles, &c.,	70 55	50 75	65 45	60 60	60 50
Ginger, prunes, &c., boxed	60 55	50 75	50 45	50 60	60 50
Furs (valuable and fancy), in cases	75 65	50 75	65 45	100 80	75 75
Furs (cheap), in cases	60 50	40 60	75 45	75 60	65 75
Gums, acacia, copal, damar, shellac, &c., in bbls	75 55	60 60	40 45	40 60	45 50
Hardware, in cases	75 65	50 75	65 45	60 70	75 60
Hemp, in bales	175 ..	200 200	150 40	150 150	250 150
Jute, in bales	200 ..	200 200	150 75	150 150	250 150
Jute butts	200 ..	200 200	150 55	150 150	250 150
Leather, sole, rough, &c., in cases	40 45	30 60	45 40	25 30	40 40
Leather, sole, rough, &c., in rolls	50 55	35 60	50 45	30 30	45 50
Leather, patent, morocco, shagreen, &c., in cases	60 65	50 75	90 55	50 50	60 60
Leather, patent, morocco, shagreen, &c., in rolls	75 85	60 75	100 60	60 60	75 75
Oakum, in bales	200 55	200 200	55 55	150 150	100 150
Opium, in tin lined cases	60 ..	40 60	50 45	60 60	60 60
Opium, not in tin lined cases	80 ..	60 ..	65 ..	100 100	75 ..
Paper, writing, flat and book, in cases	75 75	60 60	50 45	50 50	60 75
Paper, writing, flat and book, in bundles	100 100	70 ..	65 55	50 60	70 ..
Crude rubber	35 40	30 35	45 40	25 25	35 30
Seeds, canary, caraway, cardamon, &c., in bbls	75 75	75 60	45 45	60 60	75 75
Seeds, canary, caraway, cardamon, &c., in bags	100 100	100 75	50 50	70 70	100 100
Silk (raw), in bales	50 50	40 60	50 45	40 40	40 40
Saltpetre, in bbls	75 ..	75 75	65 75	60 75	.. ..
Saltpetre, in bags	150 ..	100 75	65 85	70 80	.. ..
Teas, in chests or boxes	55 55	40 60	50 45	60 60	50 50
Tobacco, foreign leaf, in bdls	85 90	70 75	50 55	100 80	100 75
Tobacco, domestic leaf, in bundles	75 100	60 75	65 65	50 70	75 65

	A.	B.	C.	D.	E.
	60	50	50	50	50
Tobacco, plug, in boxes	65	60	45	60	40
	50	60	50	40	60
Tobacco, leaf, in hhds	65	60	55	50	60
	65	40	50	40	60
Wine, in bbls	65	60	45	50	60
	75	60	65	50	75
Wine, in bottles, cased	65	75	85	60	50
	80	40	100	60	60
Whiskey, in bbls., if in small quantities	..	60	85	100	60
	40	50	45	30	40
Metal, heavy, bar, rod, angle, &c	50	60	45	25	40

It seems to me nothing could be more convincing than this list to show that something ought to be done to fix figures to measure and preserve the opinion of the majority of experts which can be the only one to approach accuracy.

The second column figure in the Universal Schedule for Warehouses, which measures the susceptibility to damage charge, was obtained after a very wide canvass, not only of underwriters but of expert merchants and manufacturers dealing with the materials themselves. From these merchants and manufacturers valuable knowledge was gained which could have been secured in no other way. For example a large wholesale druggist suggested that albumen in barrels be rated at a higher figure than the committee had fixed for it. They had supposed it a good thing to insure, not liable to damage by smoke or water and reasonable safe from fire, but were informed that heat in the neighborhood of a barrel of albumen would cook it like an egg. One merchant said he had lost a consignment of albumen on an iron steamship where a fire in a portion of the hold remote from the albumen had been put out, and the penetrating steam from the water thrown to extinguish the fire had cooked the albumen at the other end of the ship. Quinine in bottles, it was suggested by dealers in that article, would become valueless if the bottles were broken owing to the impossibility of separating the broken glass from the quinine. On the other hand, classes of merchandise which are supposed to be very susceptible to damage were found, after a careful canvass of experts, to be entitled to lower rates.

Before publishing the foregoing list, I secured the consent of each of the five gentlemen, whose mistakes, they magnanimously concede, may afford a valuable lesson to the fraternity.

They will be known only as A,' B,' C,' &c., and it will be observed that the merchandise which they attempted to rate in a twenty-five-cent warehouse is of the classes most common to the business.

I was much amused, on one occasion, by a well-known insurance expert, who said to me: "You don't expect to have a man carry around that long list of risks when he is rating, do you?"

I replied: "Yes; I don't see how he can remember them all: there are over 1,200 in the warehouse list alone; they have been fixed after careful conference, and he ought not to trust his memory. By the way,' I inquired, what do you think of the rates?"

"Oh, I think many of them are right; but I don't agree with your committee as to a large number."

"Well," said I, "you are the man we are looking for. We are doing our best to get the rates correct, and if you have any information about any of them I will be glad to have it," and, taking the book, I went over the list, noting in pencil his views as to what the rates should be on a number of classes; then, casting it aside, I engaged him in conversation for a sufficient time to admit of his forgetting his figures. At last I said to him: "By the way, what did you say should be the rate on champagne in baskets in a twenty-five-cent warehouse?"

He gave me the figure, and so, in turn, many others. Of course, he did not give the same rates as in the first instance. I could see him growing nervous, and finally I smiled and said: "Do you know it is very fortunate that I made pencil notation of the figures that you named?"

"Why?" he nervously inquired.

"Because but for that fact they would have been lost to the world. They are, of course, immensely valuable, because they were correct rates and differed from the committee figures, and if I had not noted them carefully you would have forgotten them and we would have been in the dark."

He saw the point, and I said, "Now, Brother Blank, you had better climb down; you are no smarter than the rest of us, and need to have the printed list to jog your memory, just as much

as any of us; the rates have been fixed, moreover, after too wide a canvass to be ignored."

Let no member of the fraternity laugh at my five friends who were so inconsistent with each other, and with themselves; there is no man in the business who could do better.

Surely the time has come for accepting the Universal Schedule as approximately correct, or to have it corrected by those who think it is incorrect if they can show wherein its faults lie.

It is contended by some that the Universal Schedule system of rating is neither easily nor quickly understood, and that it requires an expert to get the best results from its use. This I concede. It is not more difficult, however, than the first four rules of arithmetic, which we mastered in youth only because we were compelled to; and, while, to secure the best results, as in everything else, requires an intelligent man as a rating expert, it is safe to say that if the person applying it is ignorant and incompetent the resulting rates will yet be safer and better if he uses the Schedule than if he draws upon his own poor judgment and scant knowledge. In short, the more incompetent the man the greater the need of providing him with some sort of guide.

At this point I make a further broad claim for the Universal Schedule, for the consideration of those critics who may think that it rates too high or too low for any town or class of hazards.

First. It combines the best judgment of the largest number of underwriters ever consulted on the subject of rating.

Second. It may be applied to any town. If the rating expert were taken blindfolded to any town so as not to discover its name, he would need only to go to the fire department and the office of the waterworks, to get the particulars of fire engines, size of water mains, pressure, &c., and to the board of underwriters to get the previous fire record, in order to rate every building, and its contents, without inquiring the name of the town, and could safely leave without being informed on the subject.

Third. If the local underwriters should regard his rates as too high or too low, and should insist on raising or lowering them (in accordance with that incomprehensible tendency of some underwriters to insist upon an offhand, random opinion as to a proper rate as a standard, in utter ignorance, often, of the

details of the risk, and in greater ignorance still of the fire cost of the class to which it belongs) it would be necessary only to raise or lower all the rates by the percentage needed to adjust them to their own ideas. In short, my contention is that a schedule is simply a measure, like a two-foot rule, and if properly made and afterwards applied to any building with its contents, it will always measure the same kind of a building and the same class of merchandise or hazard at exactly the same figure; and if, in the opinion of those who prefer their own judgment, it rates too high or too low, it must rate all risks too high or too low, but should still be used as the measure, the rates being afterwards adjusted by uniform percentage deduction throughout the list, to bring those supposed to be wrong more nearly in accord with the arbitrary, dominating opinion.

To use an analogous illustration, let us suppose that two men should proceed to measure the height, area, &c., of a thousand or more buildings in a city and, preserving their field notes, should discover, after returning from their task, that their yard-stick supposed to measure thirty-six inches was only thirty inches long; they would be a pair of idiots if they should immediately proceed to take a correct yard measure and go over their entire work a second time, when they might decrease their figures just $16\frac{2}{3}$ per cent and assume they had only five-sixths as many yards as they had supposed in their dimension figures.

I have been utterly unable to understand from a logical viewpoint, the contention of some underwriters, that the Universal Schedule goes too much into detail, that it is difficult to understand and requires an unusually intelligent man to apply it. It seems to me that if a man is not intelligent enough to apply a schedule and ascertain a proper rate by using a consistent measure he certainly cannot be intelligent enough to make a rate by offhand guessing. If he cannot be trusted to compute the rate, he certainly ought not to be trusted to guess at it, for the same reason that if a man were not capable of measuring a distance with a two-foot rule, he ought not to be trusted to pace the distance or to estimate it in some other careless way.

One of the most capable rating experts in a large eastern city, employed in applying the Universal Schedule, is a young man who came to me, one day, direct from college. He de-

sired employment. I told him that if he could learn to rate by schedule he could get employment at once, but that, unfortunately, I was about leaving town for an absence of several weeks and could not give him any explanation of the schedule, such as I had been glad to give to others. "However", said I "here is the book, which is intended to fully explain the schedule; you have just come from your classes in arithmetic, algebra, geometry, chemistry and physics, and your professor did not go home with you and show you how to study any one of these sciences; I suggest that you take the schedule and 'soak' it, just as you studied your chemistry or your arithmetic, and, when you think you have mastered the theory, apply rating slips to various risks, and see me on my return."

I found, when I returned, that he thoroughly understood the schedule, and to-day he is one of the most useful men on a large staff, drawing a good salary, although he commenced on a small one.

I mention this incident to illustrate the point that no man fresh from the discipline of an educational institution would regard the task of mastering the Universal Schedule a difficult one. We are apt as we grow older to shrink from the application with which we grappled difficult problems at school where the master stood over us with a birch rod and would accept no explanation for failure, and we need, sometimes, to recall the ease with which we performed tasks and solved difficult questions simply because we were forced to grapple with them and fight to a finish.

Insurance is not an easy business, and rate-making is not easy work. It is complicated and tedious, if it is desired to reach correct results and to measure properly and equitably the difference in details of construction, occupation, fire-extinguishing appliances and exposures of one risk with another.

It has been my observation that, while the most common objection to the Universal Schedule when it was first published was its numerous items and detail, I have never met a rating expert, engaged in the task of applying it, whose idea of improving it was not that of adding to its various charges and deductions, rather than of shortening it by omitting any items. Those who have most reason to complain of its length—the men

who have to rate by it—are the very ones who prefer to make it longer rather than shorter.

The fixing of rates by a schedule consisting of many items, charges and deductions, is claimed to be arbitrary because each item is not based on actual statistics of observed facts, by a class of persons who, however, do not themselves offer any substitute or better method. They claim that the fixing of a price without actually computing the cost of each feature of construction, such as elevators, staircases, cornices, &c., &c., is empirical, overlooking the practical view of the matter, that even the most accurate measures in common use in mechanics, two-foot rules, yard-sticks, weights, &c., are not exactly correct, though practically so for the purpose intended. To decline to use a schedule so carefully prepared as the "Universal", because each item in it cannot be demonstrated to be exactly correct according to the losses through a series of years, due to the particular fault charged for, and to continue rating by rule of thumb, which is utterly unreliable, seems to me to take a pessimistic view of the whole matter and a pessimist has been defined as one who, having a choice of two evils, takes both.

In the Universal Schedule charges are made for all faults of management. I have already dwelt at such length upon the danger of rubbish, carelessness, &c., as to make it unnecessary to enlarge upon it in this connection more than to say that the rates made by the Universal Schedule, by penalizing faults of construction, occupancy, management, &c., would inevitably reduce the fires and, therefore, the fire cost; and this fact, it seems to me, is lost sight of by those critics who do not understand the system of the schedule as a whole. Wherever it has been applied in cities or, for that matter, wherever any intelligent schedule has been applied in cities or towns, the fire losses have been reduced.

FIRE COST PER ONE HUNDRED DOLLARS AT RISK.

In this connection it may be well to suggest that the statistics of fire losses and premiums, showing the percentage of one to the other, are of comparatively little value; they are more interesting than instructive. The aggregate premiums of all classes of

hazards, as a sum total, include a large number of risks, some of which are rated too high and others too low. It is the percentage of loss on each class to the *amount insured* on such class which alone indicates the fire cost; and what rate will yield a premium on which the loss ratio shall be 55% (that on which the Universal Schedule is based, and that which measures the experience of all the large companies for all the years they have been in business) can be easily determined. It will, of course, be 182% (more accurately 181.81 +) of the fire cost, whatever that may be, and the following rule may be stated:

To ascertain what rate should be fixed for any class of hazard to insure a 55% loss ratio to premium, knowing the fire cost in cents per one hundred dollars at risk, multiply such fire cost by 182. The result will be a rate on which the fire cost will be such 55%.

For example, the "fire cost" or rate of burning on a given class being 40 cents per $100 of insurance at risk, 73 cents should be the rate of premium on which 40 cents would be 55%.

In like manner, 60 cents being the fire cost, 60 multiplied by 182 equals 1.09—a rate on which the 60 cents would be 55% of the premium.

By way of further illustration, the losses for a series of years, on mercantile stocks of various kinds in what are known as the Middle States, were at the rate of 62 cents per $100 of insurance; the rate obtained averaged 72 cents, and the percentage of loss to premium was, of course, 85.4%. The rate charged should have been 113 cents per $100, on which the fire loss of 62 cents per $100 would have been 55% of the premium. Contained in these figures, however, were a number of stocks on which the loss was less than 55%, and numerous other stocks on which the loss was greater than 55% of the premiums obtained, showing that injustice had been done to some merchants, while others should have been charged higher rates, possibly for faults of management which were overlooked by underwriters and not penalized, and which, corrected, would have reduced the cost of insurance on them.

With a 55% loss ratio and 35% for expenses, making 90% in all, there would be left 10% of the premium, 5% of which should be reserved for exceptional and large conflagrations. The re-

maining 5% would probably not be regarded as an unduly large profit by merchants, who usually estimate for a 10% profit on their own sales.

Wholesale grocery stocks (without spice and coffee grinding) show a loss each year on the premiums obtained. They are usually regarded as among the best of risks, and most underwriters in considering them have in mind the idea of package goods—barreled sugar and flour, hogshead molasses, etc. The fire cost, with usual environments, has been no less than 72 cents per $100, showing that the rate obtained for a 55% loss ratio to premium should have been 131, whereas the rate obtained on the average was 101 cents, on which the percentage of loss to premium was 71%, the business being transacted at a loss.

Retail groceries show somewhat better results under protection of good fire departments.

The figures in the illustrations I have quoted were on protected business, that is, under the protection of city water works and fire departments.

Wholesale groceries have grown to be very different risks from what they were some years ago. Coffee grinding, and even coffee roasting, have been added to the hazard. In many instances preserving and canning are done. Spice grinding is quite general, and these facts may account for the inadequacy of prevailing rates. Matches are also kept in large quantities, and insurance companies who would decline a match warehouse will write a wholesale grocery freely. Some years ago the Greely-Burnham grocery store, of St. Louis, was burned, the fire being caused by the falling of a hanging platform erected about midway between the floor and the ceiling of the shipping room, in the rear of the building, the structure being a sort of hanging shelf, upon which were piled about a thousand cases of matches. These ignited when they fell, and in a few minutes the whole building was in flames. In fact, a certain class of wholesale grocery stores, like a certain class of dry-goods stores, known as "department" stores, should be rated at higher figures (and are by the Universal Schedule); but so long as underwriters fix their prices by rule of thumb they will lose money, for even the element of luck or chance is against them. If they take all risks, no matter what their faults, at a level charge,

without analyzing hazards and penalizing faults of management, the odds will continue to be against them; for chances, like loaded dice, will always fall so that they will be losers.

If the business of insurance be properly conducted, there can be, as I have already claimed, no element of luck or chance whatever in it. I cannot better illustrate this than by quoting from the able address on "Scientific Fire Rating from an Actuary's Standpoint," delivered before the Fire Underwriters' Association of the Northwest, September, 1901, by Mr. Miles M. Dawson. He says:

"All forms of insurance are alike in two things: They indemnify for loss, and they do so by means of an application of the laws of probability. In gambling parlance, insurance is 'a hedge.' That is to say, it is the direct opposite to gambling. It does not take chances, but, instead, cancels them.

"It is sometimes erroneously said that companies which engage in insurance are gambling. If they took a few risks only, the charge would be true; but we shall see that the very fundamental principle of the law of probabilities is that when a very large group is considered, chance is very nearly eliminated and the aggregate loss may be estimated within narrow limits, so that the purveying of indemnity is no more a speculation than dealing in sugar or calico, nor indeed so much. Therefore, by means of insurance we find that not merely is the hazard of the individual offset, but also that the hazard when passed over to the company and combined with others results in a reasonably reliable loss ratio, which is transmuted into a moderate tax upon all.

"The mathematical law of probability may be stated as follows: If in a large group of persons, for instance, to each of whom a certain thing appears *a priori* equally likely to happen, it does actually happen within a certain time to a certain number, then the risk that such will happen to one person in the group within such time may be represented by a fraction of which the number to whom the thing happened is the numerator and the number composing the group is the denominator."

I cannot more clearly illustrate the question of chances as they grow into certainties with larger quantities than by quoting further from Mr. Dawson's paper referred to:

"The value of a broad basis is well known to you all, and yet I am sure that an illustration will not be out of place. Common sense teaches us that, for instance, in tossing a cent the chances are even whether it shall turn up head or tail. But if it be thrown but once, it must have turned up one or the other, and if a judgment were based upon that throw only, we should have a certainty. And experience, as well as reason, teaches that there is no certainty that it will turn up once one way and once the other in two throws; nor just half the time one way and just half the time the other way in four throws or any other small number of throws. But what we mean by saying that the chances are even is that in a very large number of throws the number of heads

and the number of tails will be nearly the same, and that in an infinite number of throws they would be just the same. We expect the ratios found by actual throwing the coin to correspond more closely to the chances which we determined by reasoning about the matter the larger the number of throws. In the same way, the average fire loss which is drawn from a very large number of exposures will more accurately correspond to the real probability; and, other things being equal, it will be more reliable the more exposures it is drawn from."

"Our study of probabilities leads us to the conclusion that, strictly speaking, there is no such thing as chance—though, so far as the power of the individual to control events is concerned, of course there is and must be; but that causes are continually at work which explain all that happens, and that if our knowledge of these causes were perfect we should find ourselves in a world of certainty. If we could know all the forces that are in operation, we should not merely know which in the group were out of place there, but we should also know to which alone the event would happen, and they alone would be in place there. It follows, therefore, that it should be our task to classify and reclassify, knowing that at best the grouping is imperfect and knowing also that if it ever became perfect, not only would our labors be at an end, but there would no longer be probabilities, but merely certainties, so that insurance would be impossible. It is clear, then, that insurance and the science of probabilities are both ephemeral things which will pass away when man's knowledge is all-embracing."

And he adds, with grim humor:

"Perhaps, however, the time during which this omniscience is evolving will be sufficient for our purpose."

The insurance agent finds his task of explaining the theory of insurance to some property-holders a most difficult one. There are not a few intelligent business men who do not understand the principle upon which the business of fire insurance is based; for we not infrequently hear from the property-holder the statement that he has been insured for thirty, forty or fifty years without incurring a loss offered as an unanswerable argument why his rate should be less. It is unnecessary to explain to most of those who will read these pages that the rate of premium or price charged by a company is based, not upon the expectation of burning of a particular risk insured, but upon the number of risks of like kind which would be burned or damaged out of say a thousand in any single year. At a rate of 1%, for example, a thousand risks each insured for $10,000, would yield $100,000 in premium; if ten risks out of the thousand should burn in a year the entire amount of premium would be required to pay the loss. It is evident that a smaller number than ten must

burn or a higher rate than 1% must be obtained, to provide for expenses as well as losses.

I cannot better explain this whole matter than by referring to the passages from the National Board pamphlet on Fire Insurance and Its Relation to the Community already quoted on pages 8, 9 and 10.

Indeed, I would suggest that every insurance agent should have at his command one or more copies of this pamphlet. It was carefully prepared by a committee of the National Board appointed for the purpose, in order that this whole question of insurance should be made clear to the community, and especially to members of legislatures, in order to save us from some of the prejudice from which we now suffer, and for which we are ourselves largely to blame. The pamphlet may be secured without cost by writing to the General Agent of the National Board of Fire Underwriters, New York.

RATE OF BURNING OR ANNUAL FIRE WASTE.

It seems strange that, at this late day, published charts and the statistics of insurance departments of the various States purporting to show the results of the insurance business, should persist in showing the percentage of losses paid to premiums received—a percentage figure varying with the collection of premiums and with the payment of incurred losses, year by year. Even the percentage of "loss incurred" to "premium earned" does not, of course, determine any other fact than whether the particular company has made or lost money.

It is the fire cost, which shows the burning line, *i. e.* the amount of loss per one hundred dollars of *insurance at risk;* this is as near an approximation to the actual fire cost as is obtainable. Inadequate rates, on the one hand, or short insurance below 80% of values would increase the percentage of "incurred loss" to "premiums earned" when the actual burning for each hundred dollars at risk for the year might really be less than for the preceding year.

Much has been said and written, of late years, about an increase in the number of fires. The actual figures of the companies reporting to Insurance Departments do not show this.

The fire loss per hundred dollars at risk for the year 1900, for example, was 43.5 cents, while for 1899 it was nearly 46 cents (.00456). These figures may be easily ascertained by taking the Insurance Report for New York State, but to obtain a more accurate computation of the amount at risk than that shown in Table VII would be to deduct from the amount of risks in force as reported in the same table, three-fourths of the amount that the Unpaid Premiums reported in Table I represent. For example, the amount written in 1899, reported in Table VII, was $17,903,427,232; premium charged thereon was $173,843,155.02; figuring the average rate obtained, it was 97.1 cents. At that rate the unpaid premiums represent $2,619,763,444, at risk, all of which would, (it is safe to assume), have been in force for a period of not more than three months. The risks in force at the end of 1899 reported in Table VII amounted to $21,327,-514,889; from which deduct $1,964,822,583, being three-fourths of the amount represented by the unpaid premiums, would leave as the amount in force for the whole year $19,362,692,306.

1899.

Insurance in force (by all companies) December 31, 1899		$19,362,692,306
Losses paid in 1899	$86,251,689	
Add Losses unpaid Dec. 31, 1899	16,018,510	
	102,270,199	
Deduct unpaid Dec. 31, 1898	13,996,419	
Losses incurred for 1899	$88,273,780	

The Fire Cost being 45.6 cents for each $100 at risk.

1900

Insurance in force (by all companies) December 31, 1900		$20,342,808,584
Losses paid in 1900	$89,566,349	
Add Losses unpaid Dec. 31, 1900	15,069,998	
	104,636,347	
Deduct unpaid Dec. 31, 1899	16,018,510	
Losses incurred for 1900	$88,617,837	

The Fire Cost being 43.5 cents per $100 at risk.

1901.

Insurance in force (by all companies) December 31, 1901		$21,229,160,033
Losses paid in 1901	$93,431,176	
Add Losses unpaid Dec. 31, 1901	18,490,847	
	$111,922,023	
Deduct unpaid Dec. 31, 1900	15,069,998	
Losses incurred for 1901	$96,852,025	

The Fire Cost being 45.6 cents per $100 at risk.

It will be observed that while the amount of losses incurred for 1900 was more than that for 1899, the amount at risk was nearly one thousand million dollars greater than for 1899, so that the "fire cost" was less for 1900.

For the year 1901, it will be observed that the amount of insurance in force (due to increase in values, new buildings, &c.) had increased again nearly a thousand millions. The fire cost was 45.6 cents per $100 at risk. The losses of 1901 include the figures of the Jacksonville, Florida, fire, estimated at eleven millions of dollars. If the $6,000,000 of this amount, paid by the insurance companies were deducted, the fire cost per $100 at risk would be 43.2 cents—less than for either of the two preceding years—showing that the unprofitableness of the insurance business has been due not to the increase of fires so much as to the inadequacy of rate, and demonstrating that the increases of rate throughout the country have been needed, for the rate of loss to premium was too high for profit.

These are significant figures, and they are the only ones available for showing the "burning line" or the figure which indicates the destruction by fire, throughout the country, year by year. Rates and premiums may and do, go up or down, but the amount at risk is a more inflexible figure and the only reliable one for comparing the annual fire "waste heap" of the various years.

The average rate of earned premium per $100 insurance in force for 1899 of all companies was 65.5 cents, whereas for 1900 it was 67.5 cents, and for 1901 it was 70.1 cents. The percentage of loss to earned premium was 69.6% for 1899, 64.4% for 1900 and 65% for 1901; the earned premium of all the companies for 1899 being $126,782,865, whereas for 1900 it was $137,441,678, and for 1901 it was $148,883,610.

It is, of course, easy to ascertain the amount of loss in cents for every hundred dollars at risk of any individual company from the printed reports of its business as shown by the State records.

Ratio of Assets to amount at risk. In this connection it may be well to call attention to the fact that much vapid nonsense is published, from time to time, in the shape of advertisements as to the standing of particular companies which have no

actual significance. Some, for example, advertise that they show a larger amount of assets for every dollar of insurance in force than others; forgetting, if, indeed, they are sincere in making the claim, that the more a company has at risk outside of conflagration areas of large cities for every dollar of assets, or for every dollar of annual income, provided its acceptances are on the safer classes (which because of low rates for light hazards would show large amounts at risk) the safer, from an underwriter's viewpoint, would be the business of the company. If a small amount at risk for each dollar of assets were a test of strength, then an insurance company having all the best dwellings of the country on its books would be in worse condition than one having all the high rated specially hazardous risks; and a company whose business was confined entirely to frame planing-mills and other woodworkers would make a better showing than one having nothing but fireproof buildings! As an abstract proposition, therefore, somewhat general in its character, the larger the amount of insurance a company may have in force on well distributed, carefully selected risks of uniform average lines, the more worthy of confidence will it be.

REDUCED RATES FOR REDUCED LOSSES.

I come now to a very important matter, and my views may be regarded as radical by those underwriters who are accustomed to proceed upon the theory of getting all they can for their risks and keeping all they get, which, in my judgment, is a short-sighted policy and, in the end, a losing one. Wherever rates are unduly high, resulting in an abnormal profit, they will invite and encourage competition, which will reduce them—not discreetly, but by wholesale. Indeed, the history of the business of insurance, if illustrated on a diagram of profit and loss, of low rates and high rates, would show a curved line; seasons of depression, following high rates, caused not less by the competition of new companies, organized to take advantage of what seemed a profitable business, than by the unscrupulous cutting of that minority of underwriters, who, like the minority of all other trades or callings, are dishonest but potential for spoiling prices.

What, then, shall underwriters do if intelligent systems of rating, which penalize faults of management and secure correction of those features which result in fires, and especially in disastrous fires, shall reduce the fire cost per hundred dollars of insurance so that a lower ratio of loss than 55% is realized? It seems to me there can be no doubt that justice to the companies themselves, to prevent the incursions of newly organized companies, to say nothing of justice to property-owners, who have reduced the fire losses by improving their risks, should require that the rates of premium be reduced pro rata. Honesty is the best policy.

Let us see how safely this can be done. It is clear that when an experience of three consecutive years shall show a loss ratio lower than 55% of the premiums (for under a system of schedule rating, unlike the present systems, the percentage of loss to premium would mean something, whereas now, as already explained, it is simply interesting) one per cent reduction in rate might be made on the fourth year's premium for every one per cent that the loss ratio runs below 55%; so that if the loss ratio to premium of a city, for three consecutive years, should average 45%, it would be proper to reduce the rates on the fourth year ten per cent.

This would really be less than a pro rata or corresponding reduction in rate. For example, suppose that an average rate of 1% is obtained and that, on this rate of premium, the losses become 45%; 10% reduction in the rate of premium would give 90 cents as a rate, but 45 cents of actual loss would be only 50% of the new or reduced rate of 90 cents, 45 cents being 55% of 82 cents. This margin of difference of eight cents, in favor of the companies, would be sufficient to make up for the increased percentage of expense (for the fixed expense would be a greater percentage on the smaller premium) and to protect them against any element of luck or chance which (if the total premiums of the town were not a large figure) might happen to enter into the business of the town or city; while, on the other hand, a reduction of 1% in the rate of premium for each 1% that the loss ratio runs below the normal 55% ought to, and probably would, satisfy every reasonable property-owner.

Under such a system competition would be forestalled, the

public would be satisfied, the sympathies of property-owners would be with the companies, impressed, as they surely would be, with their fairness, and we might thenceforward count on their hearty co-operation in any measures which tended to improve the condition of a city's water supply or fire department, and especially in the correction of those faults of management, accumulation of rubbish and other fire-breeders in cellars, yards and alleys, such as caused the destruction of Fargo, Dakota. We would, moreover, have their hearty and helpful co-operation in the jury box when incendiaries were on trial and unmistakable evidence was presented of the guilt of the accused.

May we not believe that with such a broad system of equitable adjustment of rates there would be a new era in the business of insurance? Valued policy laws and adverse legislation, and even taxation, would be done away with.

RATES FOR TERM POLICIES.

There is no more inconsistent or irrational practice, resulting, as it does, in inadequate rates, than that of issuing three-year policies for two annual premiums, or five-year policies for three annual premiums. In the one case, the premium for a whole year is given to secure the risk for three years; in the other, the premium for two full years is thrown off to secure a policy for five.

Aside from the advantage of being exempt from competition while controlling a risk for a longer term than one year (an advantage which can only be desirable where the profit on the transaction will more than make up for the loss of premium thrown off) and the further advantage of securing the interest on premiums collected in advance (an advantage greatly lessened of late years by the reduction in the rate of interest from six per cent to four per cent, or even less) there is nothing whatever to excuse the practice, except in those rare cases where the annual rate is so high as to make two annuals yield a fair premium for three years, and three annuals for five years. Such excessive rates are things of the past and ought to be.

The only discount which should be made for a term policy is that of simple interest, deducted from the multiple of the annual

premium for the term of years. Even this would be in excess of the actual advantage, for it is a common error to make incorrect estimates as to the interest obtainable by writing in advance, and to overlook the fact that where the risk is kept in force, for a term of years, by annual policies renewed each year after the first, the interest on the premium for the first year, the first fifth of the term, is secured for the whole five years and, therefore, in advance; that for the second year for four years; that for the third year for three years.

The following table showing net results of an annual premium of $20 renewed five times will show that interest is calculated on the net cash received by the company each year, after paying commission:

ANNUAL PREMIUM, $20.

Premiums.		Com'n 15 per cent.	Net premium.	Interest at 5 per cent.	
1st year,	$20	$3.	$17.00	5 years' interest,	$4.25
2d year,	20	3.	17.00	4 years' interest,	3.40
3d year,	20	3.	17.00	3 years' interest,	2.55
4th year,	20	3.	17.00	2 years' interest,	1.70
5th year,	20	3.	17.00	1 year's interest,	.85
	$100		$85.00		$12.75

It will be seen that the company receives a net premium of $85 and interest $12.75—in all, $97.75.

Let us now suppose that the company, instead of writing annually, accepts a five-year risk for four annual premiums; the amount of premium received by the company will be $80; the commission paid at 15 per cent. would be $12, which deducted therefrom leaves $68—interest on which at 5 per cent. for the five years would be $17, which added to the $68 premium makes a net result to the company of $85, as opposed to $97.75 on the annual plan—a difference of $12.75 in favor of annual policies, *even on a basis of four annual premiums for five years*, instead of the prevailing basis of three annual premiums.

The rate of interest (5 per cent.) in both of these calculations is a higher rate than companies can secure, and it has not been

compounded in either case; nor has account been taken of interest-bearing balance by losses incurred each year, in either case. On a given class of risks these would, of course, average say 50 per cent. of the premiums for each year in both annual and term policies.

It is true the argument is frequently heard that, in the case of a five-year premium paid in advance, the company has so much more money in hand in case of loss, but, surely, the enthusiasm with which this argument is advanced by the advocates of term policies would indicate that they overlook the important fact that there is certainly not more than one total loss on every two hundred risks, and this item would not affect, therefore, more than about half of one per cent. of the premiums. To receive the full premium on one-half of one per cent. of all the premiums would be equivalent, on a five-year business, to $2\frac{1}{2}$ per cent. of the annual premiums in the case of losses occurring in the first part of the first year. The average date of fire would be half of the term, however, which would make this percentage $1\frac{1}{4}$ per cent. of a single year's premiums not a very large figure!

It is claimed, moreover, by term policy advocates that a more thrifty and forehanded class of customers is secured on a five-year plan, and therefore a safer class. This may be true; but rogues have been known to take out term policies, with the express intention of burning and as a cloak to such intention.

An additional argument is made that competition does not have to be met each year in the case of term policies—once on the books, the risk is apt to stay there undisturbed for the full term.

Sum up all of these claims and it is a grave question how far short they fall of the difference above shown in dollars and cents of nearly 14 per cent. less premium, *even where four annual premiums are secured.*

What is the net result, however, of a five-year policy written for *three annual premiums*—the prevailing rate? On such a basis the company receives only $60, pays $9 commission, leaving $51 net; on which, interest at 5 per cent. for five years amounts to $12.75; in all $63.75, or more than 33⅓ *per cent. less than the $97.75 which it would receive on an annual business!*

This is discounting the future with a vengeance. It seems to us a repetition of the folly of Esau, and that any company taking business on this basis is selling its birthright for a mess of pottage.

A perfectly fair consideration of the question will concede two sides to it. Term business unquestionably has some advantages. In office expense, it costs no more to write a policy for five years than a policy for one. If an adequate rate is secured, the company will be exempt from competition and lower prices for the full term. On the other hand, the tendency of competitors is toward inadequate rates by greater deductions from annual prices than all advantages may be worth, and the agent is naturally apt to lose interest in a business on which he cannot receive a commission for full five years. It behooves an underwriter to be careful in his selection of risks and in his estimate of rate. If he fails to get a proper price, he must live up to his bargain for the full term, or cancel at a loss and disadvantage. Once entered in his books, its demands upon him will be inexorable, and the approach of death is not more certain than that misfortune will overtake him who unduly discounts his future.

The subject of term policies is a very important one. More insurance companies have been wrecked on this rock of insufficient estimates for unearned premium liability than on any other.

If I have dwelt with what seems unnecessary length on this subject of rates it is because it is an important matter—in fact, the most important matter connected with the whole business, involving not merely the profitable conduct of the business of fire insurance, but, what is even more important, the enormous annual drain upon the resources of the country by reason of preventable fires and controllable fires. If underwriters, those who know best, through their opportunities for observation, do not conduct their business on lines which, by charges, indicate faults of construction or management, and, by deductions, recognize merits of appliances for extinguishing fire, but extend the protection of their insurance policies over the risks of those property-owners who ignore proper construction and careful management at the same rates that are charged to that better class of citizens who conscientiously guard against fire, the

business of fire insurance becomes a menace to the public safety.

A SYSTEM OF INSURANCE RATING WHICH DOES NOT DISCRIMINATE BETWEEN SAFE CONSTRUCTION AND UNSAFE CONSTRUCTION, AND BETWEEN CAREFULNESS AND NEGLIGENCE, IS AN INJURY TO THE COMMUNITY.

LINES.

The amount which should be written on any risk should vary, of course, according to the hazard and according to the probabilities of totality or salvage in losses. If the rates were properly made, there could be no better gauge of what the line should be than the computed amount of insurance which the average premium taken by the company, say, $100, would pay for at the rate on the risk.

When I say "average premium" I do not, of course, mean the total premiums taken by a large insurance company in a year divided by the number of risks. This would be a very small figure. But I mean the average premium which it would get on a 1% risk, say $100. If the rate on all classes should be computed by the Universal Schedule and the company's line on a 1% risk should be $10,000, it is clear that on a risk of twice the hazard, paying 2%, it should take not more than half the amount, $5,000, and at 4% should take not more than $2,500. Therefore, the rate is the best evidence of what the line should be, *always assuming that the rate has been properly made.* The rate, if correctly made, would measure every consideration which should enter into the consideration of line—construction, environment or exposure, occupancy, and susceptibility to damage, indicating the probabilities of salvage.

The argument has been made that some underwriters, under a system of rating warehouses, for example, would be tempted to take high rated risks, because they would yield the largest premiums; but this overlooks the fact that if the line be regulated by the rate, the latter being based upon accurate methods of measure, the liability to total or excessive losses of particular risks, and the frequency of fires, which enter into the question of line, are measured in the rate, and the rate ought, therefore, to afford the best evidence of what a line should be.

An underwriter's line in a particular warehouse, for example,

would be said to be full, not when he has secured $5,000 or $10,000 of insurance, but when he has secured his premium, graded according to the classes covered, no matter what the amount of the insurance may be. If the rates are properly graded, his line would not be full if he had $5,000 on a 50-cent class, and would be more than full if he had $12,000 on a 1% class. His loss on a $20,000 policy on crude rubber would not be greater than on a $5,000 stock of toys. *It is, therefore, the probable amount of loss, and not the actual amount of insurance, which determines what a line should be.*

Pursuing this reasoning that rates correctly made are the best evidence of what lines should be, I claim that an underwriter in determining the question of line on any subject of insurance, should take into consideration three features—*ignitibility, combustibility* and *susceptibility.* He should write less on risks which are peculiarly liable to take fire, peculiarly liable to be consumed before extinction and peculiarly susceptible to water or smoke damage than on subjects of insurance which are not liable to take fire, are easily extinguished and are not subject to water or smoke damage. In other words, he would write more on crude rubber and wool than on hemp or flax, German toys or leaf tobacco. If his rates are correctly made, he would write only one-fourth as much on a 1% risk as on a 25-cent risk.

In view of the fact, for example, that most of the losses (over 90% in fire department city warehouses other than fibre) are partial, it follows that the relative susceptibility to damage of the various kinds of contents would indicate their relative salvages in case of fire, and that whatever differences exist in the goods before a fire would, unless they were totally destroyed, be found reflected in the differences in damage and salvage after a fire. If we could conceive of a warehouse filled with all kinds of merchandise, subjected to exactly the same amount of heat on every square foot of floor surface, to the same amount of water thrown for extinction and the same amount of smoke, it would be found that the relative damage and salvage of each kind of merchandise would be in that proportion which its rate, if correctly made, bears to the other rates.

Average Line. Lines also depend upon the average number of risks which can be obtained of a class. The law of aver-

age approaches certainty in proportion as the number of subjects or risks liable to the contingency of fire increase. Nothing is more certain than that no more than the average number of ten thousand risks will burn through a series of years, and nothing is more uncertain than the number of a smaller quantity which will escape fire. An average might be secured by taking a small number of risks for a long series of years, as well as by taking a large number of risks for a single year, were it not for the fact that the statements of companies to the various State insurance departments require to be made up annually, and a company basing its average on a series of years might show badly in the reports for single years. The average line is usually, therefore, adjusted to a twelve months' experience, because the premiums and losses of a single class might otherwise result in an exceptional or abnormal loss ratio which would affect seriously the experience of the company for the year. This difficulty, however, can be met in the case of those classes of which enough cannot be obtained to make an average, by confining the lines assumed on such classes to that sum for which the average premium on all classes taken by the company would pay.

If, for example, the company's average premium should be $50 (throwing out of the account the small, so-called "chicken-feed" business of small dwellings, etc., which are annually assumed) it would be safe to write $10,000 on a 50-cent risk (the rate being accurately computed) or $5,000 on a 1% risk. Let us suppose that there are ten classes of hazards of which there are only 100 specimens of each in the country, and that they range in proper rate from 25 cents up. Insurance on them would be theoretically adjusted as per the following table:

No. Risks.	Rate.	Line.	Total Premium.
100	.25	$20,000	$5,000
100	.50	10,000	5,000
100	1%	5,000	5,000
100	2%	2,500	5,000
100	4%	1,250	5,000
100	5%	1,000	5,000
100	6%	833	5,000
100	7%	714	5,000
100	8%	625	5,000
100	10%	500	5,000
1,000			$50,000

We here have 1,000 risks, each differing from the others in hazard, but with lines graded according to hazard, yielding a premium of $50,000, on which the loss should be 55%, or $27,500. It would make no difference which of the risks should take fire—those of greater or less ignitibility, combustibility or susceptibility—as the lines are graded in proportion to figures which exactly measure relative degrees of damage and salvage. If fires occur in the risks of greater hazard the amount of loss will still be proportional to the total premium obtained, while if they should occur in those of lower rates the fires would be more surely partial. Fifty dollars of premium buys just so much hazard; and as, in adding fractions, it is necessary to reduce those of different denominators to a common denominator, so in the foregoing example, rate may be regarded as the common denominator of the various hazards of the different classes of risks, and this combination of them would be as safe, from a true underwriting standpoint, as would a group of a thousand risks of any one of the classes.

Of course, the example would be more forceful and the tabulation safer if the number of risks were 10,000 instead of 1,000; and, of course, while this proposition is scientifically true from the viewpoint of arithmetical computation and the law of average, it would not be in actual practice necessary to lay such strict limitations upon acceptances; for no great risk would be run, for example, by taking $2,500 lines on the 10% hazards, because the burning of a few of them would not be a serious matter and might meet the conveniences of the business; while, on the other hand, it might not be advisable to accept $20,000 on 25-cent risks.

It is, probably, unnecessary to add that it would be perfectly safe to take a large number, say 10,000, of 10% hazards for a full line of $10,000, since there would then be enough of the class to make the average line, though large, a safe one. My contention simply being that where there is not enough individuals of any one hazard to make a safe class by itself, it being necessary by reason of the small number of such class to rely on the general average of others, the line on the more dangerous classes must be graded to equalize the proper proportion of losses on all classes.

This whole matter may be made clearer still, perhaps, if we take only two classes, peculiar in the respect that they are exactly equal in "combustibility" and "susceptibility" to the extent that no partial losses are secured, all losses being total, while, on the other hand, one is exactly twice as ignitible as the other, in which case there would be just twice the number of fires on the same number of risks in a year. Let us assume, therefore, two such hypothetical classes, one rated at 5% and the other at 10%, one being just double the other as to the risk of ignitibility. There would be just twice as many fires and, consequently, twice as many total losses in the 10% class as in the 5% class; and this being a fact, not over half as much should be accepted on the 10% class as on the 5% class. While it might be perfectly safe to take a thousand risks of either for the maximum line of the 5% class, let us assume that we can only get 500 of each, the example would then stand as follows. If the rates are graded for a 60% loss ratio of premiums, all losses being total, there would be, say, 15 losses, amounting to $300,000, of the 5% class, and 30 losses, amounting to $300,000, of the 10% class. (I have assumed a 60% loss ratio to premiums instead of 55% simply to make computations easier.)

No. Risks.	Line.	Rate.	Total Prem.	No. of Fires.	Total Loss.	%.
500	$20,000	5%	$500,000	15	$300,000	60%
500	10,000	10%	500,000	30	300,000	60%
1,000			$1,000,000		$600,000	60%

If, now, on the other hand, with the rates still graded as in the foregoing example for a 60% loss ratio to premiums, the number of risks of each class and the amounts should be changed, we could easily have the following problem as a possibility:

No. Risks	Line.	Rate.	Total Prem.	No. Losses.	Total amount of Losses.
800	$20,000	5%	$800,000	20	$400,000
100	100,000	5%	500,000	7	700,000
80	10,000	10%	80,000	1	10,000
20	100,000	10%	200,000	5	500,000
1,000			$1,580,000		$1,610,000 or 102%.

It will be observed that we still have 1,000 risks, that the rates remain the same (10% and 5% respectively), the number of

losses per 100 risks has not changed, being at the rate of 3 losses per 100 risks of the 5% hazards, (27 in all) and at the rate of 6 losses per 100 risks for the 10% hazards. The lines, however, have been changed. In place of 500 $20,000 lines of the 5% class we now have 800 $20,000 lines and 100 $100,000 lines, and on the 10% class we have 80 $10,000 lines and 20 $100,000 lines. It is not necessary to say that although there might be no more or no less losses per hundred risks than before, they might easily fall on the $100,000 lines instead of on the $10,000 lines, and if they should, as in the table, the result would be a loss of over 102% of the total premiums instead of 60% as before, because the laws of average have been violated. When those laws are observed, the business of insurance, instead of being a wager and an uncertainty, becomes a certainty and results can be counted upon with greater confidence than in any other business.

The moment the number of risks in any class fall below the number necessary to make an average for that class, the number of risks accepted must lean upon those of other classes, and therefore the *line must be lowered to meet the average premium received on the other classes*, if the proper loss ratio to premium is to be maintained. To depart from this law is simply to gamble. It is not underwriting. It would be as idiotic to conduct the business of insurance on such lines as for a merchant to say to a customer with one hundred dollars "You may go into my store and, for your hundred dollars, take 100 yards of any fabric you please," instead of saying to him "You may take 10 yards of $10 velvet, or 100 yards of $1 silk, or 2,000 yards of 5-cent calico."

The statement is frequently heard that a company having a large premium income of, say, four million dollars can afford to take larger lines than when it had an income of one million. This is approximately true within certain limitations. Theoretically, it is untrue in every respect; for if the premium income of four million dollars is made up of a large number of non-hazardous risks there will be no margin with which to pay an exceptional loss on a risk of high ignitibility: If the rates have been graded properly, all of the four millions will be needed to pay the $2,200,000 (or 55%) of losses inevitably due to the hazard of carrying the four millions of risks, and the excess

losses will have to be paid, not out of premiums but, out of what would have been and ought to have been profit.

The underwriting laws deduced from these propositions are certainly the following:

First. At least one thousand risks (better ten thousand) should be secured of a class to make an average on the class. If a sufficient number can be secured the class will take care of itself without regard to the other writings of the company.

Second. If a sufficient number of a class cannot be secured for an average, the class may still be accepted, but *only for such lines as would be paid for with the average premium of the company on, say, a safe medium class of risks*—1% risks, for example.

Third. Rates *if correctly made* would always indicate the line which might safely be written, for they would measure accurately the three features of a risk—ignitibility, combustibility and susceptibility which must always be taken into account in determining line, in addition to features of fire department protection and exposure charges, which measure the ignitibility, combustibility and susceptibility features of other risks endangering it.

Fourth. An average may be secured either by, say, 1,000 risks of a single class, or by 1,000 risks of different classes but for no greater line than the average premium of the class will pay for at the rate of the class; or by 1,000 risks all of the same rate but of different classes—in which case the line would be the same on all. It would clearly be as safe to write one thousand 3% risks, of 1,000 different classes, as to write a thousand 3% risks of a single class.

Fifth. An adequate rate does not involve—what some underwriters contend it does—that any line may be written, on the supposition that because the rate is adequate, it will pay for the line. The safe line depends not alone on the adequacy of the rate, but upon the number of risks of the class written, which must be sufficiently large to secure an average.

All of these propositions are based theoretically upon correct rates and ideal conditions, rather than on practice and actual conditions. It might not be expedient or possible to get a mimimum line on each of the most hazardous risks or to write

the maximum on each of the best risks. We would be perfectly safe, of course, to take $2,500 on a risk as a mimimum; much more safe (and probably in five years out of six it would result in more profit) than to take exceptionally large lines on good risks, unless an exceptionally large number of such good risks could be secured, in which case any line is safe if the number be large enough to reduce to a certainty the possibilities of a single year.

Companies, however, generally give their agents full instructions as to the lines to be written and these instructions should be followed to the letter. Under no circumstances should the agent deviate from them to act on his own theories as to lines, or on the views I have expressed in this article.

UNEARNED PREMIUM.

WHAT IS THE REINSURANCE FUND, OR UNEARNED PREMIUM LIABILITY OF A FIRE INSURANCE COMPANY?

There are diverse opinions upon the subject. Some underwriters contend that it is a fund which would be sufficient to pay the fire losses on policies in force, and that it will prove adequate or inadequate according to the sufficiency of the rate obtained. Others, that it is a fund which should be sufficient to induce another company to assume the executory contracts and relieve the first from all obligation under them. In the light of numerous instances of the assumption of such obligations at from sixty to seventy per cent. of the reserve of the retiring company, it is with no little complacency that some underwriters contend that their reserve is from thirty to forty per cent. too high, holding that the company could "reinsure" its entire business and retain that percentage of the reserve charged as a liability, counting it as net surplus.

Neither supposition is the correct one. The Reinsurance Fund of a company should represent the exact sum required to pay to the holders of its policies the pro rata unearned premium for their unexpired terms, and thus relieve the company of all liability under them. In case of bankruptcy, the law requires that a receiver shall immediately relieve the company of all executory contracts, holding, with much reason, that, as the company's failure must be due to the unprofitableness of its business, growing out of inadequate rates or bad risks, it is for the interest of all concerned, as creditors, that running contracts should be at once terminated and the estate relieved from possible further claims. In this light, it obviously makes no difference whether the rates be adequate or inadequate for carrying the risk, or whether the fund be ample or insufficient for paying subsequent losses. *If it be sufficient, under the terms of*

each policy, as a tender to the assured to relieve the company from all obligation to him, it is ample for the purpose which the law contemplates. One dollar per one hundred dollars per annum may be a grossly inadequate rate for a planing-mill; but if that be the rate at which the policy was issued, 50 cents per one hundred dollars, at the end of six months, will be sufficient return premium to cancel the policy and discharge the company from all liability to the holder of it. It is, of course, true, however, that the Reinsurance Fund will prove a valuable asset if the risks have been selected with judgment and at adequate rates. Inasmuch as the experience of all companies shows that a larger percentage of the fire loss occurs in the earlier part of the term for which the policy is written, than in the latter years of the term, due, probably, as a matter of theory, to the fact that a large proportion of the moral hazard and also of the physical hazard, faults of construction, defects in flues, etc., naturally develop themselves early in the life of the risk, it follows that the percentage of loss upon the unearned premium fund must, of necessity, be lower than that of the year in which the policies were taken.

To assume, as has been by some contended, that the Reinsurance Fund of a company should be computed on the basis of adequate rates to measure the hazards covered, and that the full amount of unearned premium necessary to carry each particular risk should be reserved, no matter what the Company may have accepted as the price for its policy, would be to assume that the State, to enforce the law, could provide a sufficient force of experts competent to pass upon the adequacy of rates —an assumption which would be preposterous, since the reserve of a single company could not be examined by the most diligent expert in a year's time, if at all. Such examination could not be made from the books of the Company, according to rules for classes, since risks exposed by others would seldom present the same conditions and each would have to be decided on its own merits by taking into account exposures, locality, fire departments and all other factors which enter into the consideration of price, the rate of each risk being as much a matter of expert judgment and as independent of set rules as is the grading of qualities of corn, wheat, flour, tobacco or tea by experts in those respective commodities. Any law, therefore, requiring

adequacy of rates in the unearned premium fund which did not contemplate examination by experts—a physical impossibility—and punishment for noncompliance, would be simply mandatory and, therefore, inoperative. It would have the effect only of binding honorable companies, who would make honest returns, and of leaving unbound dishonorable companies, who would disregard its provisions, knowing that detection and punishment were alike impossible.

Most property-owners, legislators and not a few underwriters, seem to overlook the fact that the unearned premium reserve of an insurance company represents *an actual contractual debt to the holder of each policy for his pro rata share of the premium measuring the unexpired time.* His policy provides this, and a premium, therefore, is not the property of the company when paid to it; for the company is simply in the position of a trustee who has given a receipt for it and is under agreement to return a proper portion of it if he wishes to be relieved of his liability. The term "reinsurance reserve," therefore, has always been a misnomer; a better name for the fund would be Unearned Premium Liability.

Some years ago a bill was introduced into the legislature of the State of New York excusing a company from holding in hand more than the net amount of unearned premium, after deducting any sum which may have been paid to the agent or broker as commission or brokerage. This bill never became a law. Its advocates overlooked the important fact that an amount paid by a company to an agent or broker for rendering it a service could not be regarded as an offset against the claim of the policyholder, who was entitled to the pro rata unearned portion of the premium paid by him, without regard to what disposition the company may have made of it.

The principle upon which the New York Insurance Department very properly requires that the unearned premium liability shall be computed on annual and term policies is one of equation of dates. An annual policy written on the first day of January would have only one day to run on the 31st of December, while one written on the 31st of December would have 364 days to run. The two would exactly equate each other, and the average earning of the two would be six months, or one-half. A com-

pany, therefore, accepting business through each of the twelve months, for an equal amount each month, would, on its annual business have earned, at the close of the year, one-half of its premiums on annual policies and a pro rata portion of all term policies.

For example, the earned portion of a two-year policy at the end of the first year would be that proportion of the premium which the equated time bears to the full term, viz: six months to twenty-four, or one-fourth. Three-fourths, therefore, of a two-year policy should be reserved as unearned at the close of the year in which it is written. In like manner, a three-year policy would, in the year of its issue, earn one-sixth, or that proportion which six months bears to three years, or thirty-six months, and would have remaining unearned, at the close of the year, five-sixths of its premium. A four-year policy, in like manner, would earn one-eighth and have seven-eighths unearned at the close of the year; and a five-year policy would earn one-tenth and have nine-tenths unearned at the end of the year. Terms exceeding five years are, of course, computed on the same basis. During the second year, the remaining half of the first year's writings of annual policies (in addition to one-half of the new) would be earned, and a full twelve months of all term policies, viz., one-half of the two-year writings of the previous year, one-third of the three-year writings, one-fourth of the four-year writings, one-fifth of the five-year writings, &c., &c. It will be seen in the case of a five-year policy, that it is not until the close of the sixth year that the company has earned all of the writings of the first year, there remaining unearned, at the beginning of the year, one-tenth of the premiums received in the first year of the six.

Hypothetical Business Table. The following table shows the progress of a hypothetical business of $200,000 per month, amounting to $2,400,000 per annum, divided as follows: $1,000,-000 of annual business, $200,000 of two-year business, $300,000 of three-year business, $400,000 of four-year business, and $500,000 of five-year business. In actual practice, these amounts would be diminished, year by year, by the cancellations taking place, from various causes; but omitting, for purposes of illustration, this disturbing influence, and assuming that the business is maintained for the exact amount, year by year, through

a period of six years—each policy being renewed so soon as it expires, the proportions of annual and term business being the same, the acceptances each month a pro rata portion of the annual receipts and divided according to terms of policies in the same manner—it must be clear, as will be seen by the table, that at the end of the sixth year, and during the seventh and every subsequent year, the amount written each month would exactly balance the amount expiring, and the unearned premium liability would remain unchanged at the close of each year, and indeed, *on any one day of the year.* The writer computed this table for the purpose of testing the accuracy of his Table "B" and believes it will present interesting features for the consideration and study of underwriters.

Let us assume that a company commenced business in the year 1882, receiving premiums of $2,400,000, divided in one, two, three, four and five year policies as per the table. At the end of that year it had earned one-half of its annual business, $500,000, and had an equal amount unearned; it had earned one-quarter of its two-year business, $50,000, and had unearned three-quarters, or $150,000; it had earned one-sixth of its three-year business, $50,000, and had unearned five-sixths, $250,000; it had earned one-eighth of its four-year business, $50,000, and had unearned seven-eighths, $350,000; it had earned one-tenth of its five-year business, $50,000, and had unearned nine-tenths, $450,000. Total earned, $700,000. Total unearned, $1,700,000.

At the end of the second year, having transacted identically the same amount of business in each of the terms, it would have earned the remaining half of the first year's annual business, $500,000, and also one-half of the 1883 business. On its two-year business written in 1882, it would have earned a full year, $100,000 and one-fourth of the current year's policies, $50,000. On its three-year business it would have earned a full year, or one-third of the writings of 1882, $100,000, and one-sixth of the writings of 1883, the current year, $50,000; total, $150,000. On its four-year business it would have earned a full year or one-fourth of the writings of 1882, $100,000, and also one-eighth of the writings of the current year, $50,000; and on its five-year business it would have earned a full year or one-fifth of the writings of 1882, $100,000, and one-tenth of the writings of the

TABLE A.

(HYPOTHETICAL BUSINESS. : $2,400,000 OF PREMIUMS ANNUALLY.)

Unearned Premium Liability.

1st YEAR. 1882.

TERM	PREMIUM.	EARNED.			UNEARNED.		
1 Year	1,000,000	$\frac{1}{2}$	500,000	500,000	$\frac{1}{2}$	500,000	500,000
2 "	200,000	$\frac{1}{4}$	50,000	50,000	$\frac{3}{4}$	150,000	150,000
3 "	300,000	$\frac{1}{6}$	50,000	50,000	$\frac{5}{6}$	250,000	250,000
4 "	400,000	$\frac{1}{8}$	50,000	50,000	$\frac{7}{8}$	350,000	350,000
5 "	500,000	$\frac{1}{10}$	50,000	50,000	$\frac{9}{10}$	450,000	450,000
	2,400,000		700,000	700,000		1,700,000	1,700,000

2nd YEAR. 1883.

TERM	PREMIUM.	EARNED.			UNEARNED.		
1 Year	1,000,000	$\frac{1}{2}$	500,000		$\frac{1}{2}$ of '83	500,000	
		$\frac{1}{2}$ of '82	500,000	1,000,000			500,000
2 "	200,000	$\frac{1}{4}$	50,000		$\frac{3}{4}$ of '83	150,000	
		$\frac{1}{2}$ of '82	100,000	150,000	$\frac{1}{4}$ of '82	50,000	200,000
3 "	300,000	$\frac{1}{6}$	50,000		$\frac{5}{6}$ of '83	250,000	
		$\frac{1}{3}$ of '82	100,000	150,000	$\frac{1}{2}$ of '82	150,000	400,000
4 "	400,000	$\frac{1}{8}$	50,000		$\frac{7}{8}$ of '83	350,000	
		$\frac{1}{4}$ of '82	100,000	150,000	$\frac{5}{8}$ of '82	250,000	600,000
5 "	500,000	$\frac{1}{10}$	50,000		$\frac{9}{10}$ of '83	450,000	
		$\frac{1}{5}$ of '82	100,000	150,000	$\frac{7}{10}$ of '82	350,000	800,000
	2,400,000		1,600,000	1,600,000		2,500,000	2,500,000

3rd YEAR. 1884.

TERM	PREMIUM.	EARNED.			UNEARNED.		
1 Year	1,000,000	$\frac{1}{2}$	500,000		$\frac{1}{2}$ of '84	500,000	500,000
		$\frac{1}{2}$ of '83	500,000	1,000,000			
2 "	200,000	$\frac{1}{4}$	50,000		$\frac{3}{4}$ of '84	150,000	
		$\frac{1}{2}$ of '83	100,000	200,000	$\frac{1}{4}$ of '83	50,000	200,000
		$\frac{1}{4}$ of '82	50,000				
3 "	300,000	$\frac{1}{6}$	50,000		$\frac{5}{6}$ of '84	250,000	
		$\frac{1}{3}$ of '83	100,000	250,000	$\frac{1}{2}$ of '83	150,000	
		$\frac{1}{3}$ of '82	100,000		$\frac{1}{6}$ of '82	50,000	450,000
4 "	400,000	$\frac{1}{8}$	50,000		$\frac{7}{8}$ of '84	350,000	
		$\frac{1}{4}$ of '83	100,000	250,000	$\frac{5}{8}$ of '83	250,000	
		$\frac{1}{4}$ of '82	100,000		$\frac{3}{8}$ of '82	150,000	750,000
5 "	500,000	$\frac{1}{10}$	50,000		$\frac{9}{10}$ of '84	450,000	
		$\frac{1}{5}$ of '83	100,000	250,000	$\frac{7}{10}$ of '83	350,000	
		$\frac{1}{5}$ of '82	100,000		$\frac{5}{10}$ of '82	250,000	1,050,000
	2,400,000		1,950,000	1,950,000		2,950,000	2,950,000

4th YEAR. 1885.

TERM	PREMIUM.	EARNED.			UNEARNED.		
1 Year	1,000,000	$\frac{1}{2}$	500,000		$\frac{1}{2}$ of '85	500,000	500,000
		$\frac{1}{2}$ of '84	500,000	1,000,000			
2 "	200,000	$\frac{1}{4}$	50,000		$\frac{3}{4}$ of '85	150,000	
		$\frac{1}{2}$ of '84	100,000		$\frac{1}{4}$ of '84	50,000	200,000
		$\frac{1}{4}$ of '83	50,000	200,000			
3 "	300,000	$\frac{1}{6}$	50,000		$\frac{5}{6}$ of '85	250,000	
		$\frac{1}{3}$ of '84	100,000		$\frac{1}{2}$ of '84	150,000	
		$\frac{1}{3}$ of '83	100,000		$\frac{1}{6}$ of '83	50,000	450,000
		$\frac{1}{6}$ of '82	50,000	300,000			
4 "	400,000	$\frac{1}{8}$	50,000		$\frac{7}{8}$ of '85	350,000	
		$\frac{1}{4}$ of '84	100,000		$\frac{5}{8}$ of '84	250,000	
		$\frac{1}{4}$ of '83	100,000		$\frac{3}{8}$ of '83	150,000	
		$\frac{1}{4}$ of '82	100,000	350,000	$\frac{1}{8}$ of '82	50,000	800,000
5 "	500,000	$\frac{1}{10}$	50,000		$\frac{9}{10}$ of '85	450,000	
		$\frac{1}{5}$ of '84	100,000		$\frac{7}{10}$ of '84	350,000	
		$\frac{1}{5}$ of '83	100,000		$\frac{5}{10}$ of '83	250,000	
		$\frac{1}{5}$ of '82	100,000	350,000	$\frac{3}{10}$ of '82	150,000	1,200,000
	2,400,000		2,200,000	2,200,000		3,150,000	3,150,000

over)

5th YEAR. 1886.

1 Year	1,000,000	$\frac{1}{2}$	500,000		$\frac{1}{2}$ of '86	500,000	500,000
		$\frac{1}{2}$ of '85	500,000	1,000,000			
2 "	200,000	$\frac{1}{4}$	50,000		$\frac{3}{4}$ of '86	150,000	
		$\frac{1}{2}$ of '85	100,000		$\frac{1}{4}$ of '85	50,000	200,000
		$\frac{1}{4}$ of '84	50,000	200,000			
3 "	300,000	$\frac{1}{6}$	50,000		$\frac{5}{6}$ of '86	250,000	
		$\frac{1}{3}$ of '85	100,000		$\frac{3}{6}$ of '85	150,000	
		$\frac{1}{3}$ of '84	100,000		$\frac{1}{6}$ of '84	50,000	450,000
		$\frac{1}{6}$ of '83	50,000	300,000			
4 "	400,000	$\frac{1}{8}$	50,000		$\frac{7}{8}$ of '86	350,000	
		$\frac{1}{4}$ of '85	100,000		$\frac{5}{8}$ of '85	250,000	
		$\frac{1}{4}$ of '84	100,000		$\frac{3}{8}$ of '84	150,000	
		$\frac{1}{4}$ of '83	100,000		$\frac{1}{8}$ of '83	50.000	800,000
		$\frac{1}{8}$ of '82	50,000	400,000			
5 "	500,000	$\frac{1}{10}$	50.000		$\frac{9}{10}$ of '86	450,000	
		$\frac{1}{5}$ of '85	100.000		$\frac{7}{10}$ of '85	350,000	
		$\frac{1}{5}$ of '84	100,000		$\frac{5}{10}$ of '84	250,000	
		$\frac{1}{5}$ of '83	100,000		$\frac{3}{10}$ of '83	150,000	
		$\frac{1}{5}$ of '82	100,000	450,000	$\frac{1}{10}$ of '82	50,000	1,250,000
	2,400,000		2,350,000	2,350,000		3,200,000	3,200,000

6th YEAR. 1887.

1 Year	1,000,000	$\frac{1}{2}$	500,000		$\frac{1}{2}$ of '87	500,000	500,000
		$\frac{1}{2}$ of '86	500,000	1,000,000			
2 "	200,000	$\frac{1}{4}$	50,000		$\frac{3}{4}$ of '87	150,000	
		$\frac{1}{2}$ of '86	100,000		$\frac{1}{4}$ of '86	50,000	200,000
		$\frac{1}{4}$ of '85	50,000	200,000			
3 "	300,000	$\frac{1}{6}$	50,000		$\frac{5}{6}$ of '87	250,000	
		$\frac{1}{3}$ of '86	100.000		$\frac{3}{6}$ of '86	150,000	
		$\frac{1}{3}$ of '85	100,000		$\frac{1}{6}$ of '85	50,000	450,000
		$\frac{1}{6}$ of '84	50,000	300,000			
4 "	400,000	$\frac{1}{8}$	50,000		$\frac{7}{8}$ of '87	350,000	
		$\frac{1}{4}$ of '86	100,000		$\frac{5}{8}$ of '86	250,000	
		$\frac{1}{4}$ of '85	100,000		$\frac{3}{8}$ of '85	150,000	
		$\frac{1}{4}$ of '84	100,000		$\frac{1}{8}$ of '84	50,000	800,000
		$\frac{1}{8}$ of '83	50,000	400,000			
5 "	500,000	$\frac{1}{10}$	50 000		$\frac{9}{10}$ of '87	450,000	
		$\frac{1}{5}$ of '86	100,000		$\frac{7}{10}$ of '86	350,000	
		$\frac{1}{5}$ of '85	100,000		$\frac{5}{10}$ of '85	250,000	
		$\frac{1}{5}$ of '84	100,000		$\frac{3}{10}$ of '84	150,000	
		$\frac{1}{5}$ of '83	100,000		$\frac{1}{10}$ of '83	50,000	
		$\frac{1}{10}$ of '82	50,000	500,000			1,250,000
	2,400,000		2,400,000	2,400,000		3,200,000	3,200,000

current year, $50,000. The total earnings would be $1,600,000, and the total unearned, $2,500,000.

It will be observed that, during the second year, the earnings on one-year business are equal to the writings. This will be the case thenceforward. During the third year the earnings on the two-year business will also equal the writings, and this will be the case thenceforward. During the fourth year the earnings on the three-year business will equal the writings. But in the case of five-year business, it is not until the sixth year that the earnings equal the writings, $500,000.

The Table for Computing Monthly Unearned Liability. This table (see Table "B") is the result of careful thought and study of the conditions of the hypothetical business above explained. It was devised by the writer for the purpose of simplifying the work of computing the unearned premium on the current business, month by month, equating it with the expirations on the old table of policies in force written in previous years. All companies, probably—certainly all of the larger companies—find it necessary to classify the writings each month, according to term. It will require little additional labor to post the result of a month's writings in the proper column of the table assigned to the month. The footing of this column will show the progress of the unearned premium liability and enable an officer to determine the drift of the company, whether in the direction of an increasing or decreasing liability, in this important item. The table, moreover, will save, by division of labor throughout the year, much of the confusion and hurry incident to the accumulation of work at its close, when the results of the entire business are necessary in order to make up statements, either for Boards of Directors or for State departments.

It will be borne in mind that this table is arranged to compute the progress of the Company in unearned premium liability in accordance with the New York State law. A precise computation of unearned premium would be by averaging the earnings of months, viz, by twenty-fourths. For example, the annual business written in January would be 15 days or $\frac{1}{24}$ unearned on the 31st of December; and February business $\frac{3}{24}$ unearned. The five year business written in January would be $\frac{97}{120}$ unearned on the 31st of December, etc., etc.,the calcu-

lations by fractions being more easily made by their reciprocals or decimal equivalents. The New York law, however, equating each year's writings as six months earned, is practically correct, and the computations by months, although practiced by a few companies, would be, in the case of large companies especially, so laborious and expensive in clerk hire as to be not worth the cost. In the absence of any abnormal increase of the business during the closing months of the year, for example, the equation by yearly writings is, for all practical purposes, accurate; and in case of any abnormal increase of business, allowance can easily be made for the fact by any intelligent underwriter.

Explanation of Table B. In the upper left corner of the table is inserted the unearned table of the Company at the close of the preceding year. In this case the unearned table of the sixth and last year of Table A has been inserted. The amount earnable during the current year in this table is obtained in the following manner: There being $500,000 of one-year business unearned at the beginning of the year, the whole of it will be earned during the current year. On the two-year business there being $150,000 unearned at the beginning of the year, a full year, or one-half of the writings of 1887; viz, $100,000, would be earned during the current year, and also the $50,000 remaining of the two-year business written in 1886—there being only one-quarter of the writings of 1886 remaining unearned at the beginning of the year, the first quarter, or six months, having been earned during the year in which it was written.

In like manner in the case of three-year business, a full year or one-third of the writings of each of the previous years will be earned, with the exception of 1885, in which only six months, or one-sixth, remains unearned at the beginning of the year, the remaining one-sixth having been earned during the year 1885. And on the five-year business, a full $100,000, or one year's premiums, will be earned on each of the year's writings, except that of 1883, of which only $50,000, or one-tenth, remains unearned at the beginning of the year.

In other words, a full year will be earned of the writings of previous years except as to those years of which only six months' business remains in force at the beginning of the year. It will be seen that $1,700,000 premium will be earned during the current year, 1888, and that of this sum $\frac{1}{12}$, or $141,667, will be

TABLE B.

TABLE SHOWING UNEARNED PREMIUM LIABILITY EACH MONTH.

UNEARNED PREMIUM AT BEGINNING OF YEAR.					JANUARY 31ST.		FEBRUARY 28TH.		MARCH 31ST.		APRIL 30TH.		MAY 31ST.		JUNE 30TH.	
YEAR	TERM	PREMIUMS	Earnable During Year	Unearned at Beginning of Year	Earned	Unearned	Earned	Unearned	Earned	Unearned	Earned	Unearned	Earned	Unearned	Earned	Unearned
1887	1 year	1,000,000	500,000	500,000												
1886	2 "	200,000	50,000	50,000												
1887	2 "	200,000	100,000	150,000												
1885	3 "	300,000	50,000	50,000												
1886	3 "	300,000	100,000	150,000												
1887	3 "	300,000	100,000	250,000												
1884	4 "	400,000	50,000	50,000												
1885	4 "	400,000	100,000	150,000												
1886	4 "	400,000	100,000	250,000												
1887	4 "	400,000	100,000	350,000												
1883	5 "	500,000	50,000	50,000												
1884	5 "	500,000	100,000	150,000												
1885	5 "	500,000	100,000	250,000												
1886	5 "	500,000	100,000	350,000												
1887	5 "	500,000	100,000	450,000												
Long																
		6,400,000	1,700,000	3,200,000	141,667	3,058,333	283,333	2,916,667	425,000	2,775,000	566,666	2,633,334	708,333	2,491,666	850,000	2,350,000
WRITINGS OF CURRENT YEAR.																
MONTH	TERM	PREM. WRITTEN	Earnable During Year	Unearned at End of Year												
Jan.	Short															
	1 year	83,334	41,667	41,667												
	2 "	16,666	4,166	12,500												
	3 "	25,000	4,167	20,833												
	4 "	33,333	4,166	29,167												
	5 "	41,667	4,167	37,500												
	Long															
Total for mo.		200,000	58,333	141,667	58,333	141,667	58,333	141,667	58,333	141,667	58,333	141,667	58,333	141,667	58,333	141,667
Feb.	Short															
	1 year	83,334	41,667	41,666												
	2 "	16,666	4,167	12,500												
	3 "	25,000	4,167	20,833												
	4 "	33,333	4,167	29,167												
	5 "	41,667	4,166	37,500												
	Long															
Total for mo.		200,000	58,334	141,666			58,334	141,666	58,334	141,666	58,334	141,666	58,334	141,666	58,334	141,666
Mch.	Short															
	1 year	83,334	41,667	41,667												
	2 "	16,667	4,166	12,500												
	3 "	25,000	4,167	20,833												
	4 "	33,333	4,166	29,167												
	5 "	41,667	4,167	37,500												
	Long															
Total for mo.		200,000	58,333	141,667					58,333	141,667	58,333	141,667	58,333	141,667	58,333	141,667
April	Short															
	1 year	83,334	41,667	41,666												
	2 "	16,666	4,167	12,500												
	3 "	25,000	4,167	20,833												
	4 "	33,333	4,167	29,167												
	5 "	41,667	4,166	37,500												
	Long															
Total for mo.		200,000	58,334	141,666							58,334	141,666	58,334	141,666	58,334	141,666
May	Short															
	1 year	83,334	41,667	41,667												
	2 "	16,666	4,166	12,500												
	3 "	25,000	4,167	20,833												
	4 "	33,333	4,166	29,167												
	5 "	41,667	4,167	37,500												
	Long															
Total for mo.		200,000	58,333	141,667									58,333	141,667	58,333	141,667
June	Short															
	1 year	83,334	41,667	41,667												
	2 "	16,666	4,167	12,500												
	3 "	25,000	4,167	20,833												
	4 "	33,333	4,166	29,167												
	5 "	41,667	4,166	37,500												
	Long															
Total for mo.		200,000	58,333	141,667											58,333	141,667
Forward–6 mos.		1,200,000	350,000	850,000												
					200,000	3,200,000	400,000	3,200,000	600,000	3,200,000	800,000	3,200,000	1,000,000	3,200,000	1,200,000	3,200,000
Deduct—(each month) CANCELLATIONS—to date—unexpired portion.																
Deduct—(each month) RE-INSURANCE—to date—unexpired portion.																

(over.)

		Premiums	Earnable During Year	Unearned at End of Year	July 31st. Earned	July 31st. Unearned	August 31st. Earned	August 31st. Unearned	September 30th. Earned	September 30th. Unearned	October 31st. Earned	October 31st. Unearned	November 30th. Earned	November 30th. Unearned	December 31st. Earned	December 31st. Unearned
Brought Forward—earned and unearned on old table.					991,667	2,208,333	1,133,333	2,066,667	1,275,000	1,925,000	1,416,666	1,783,334	1,558,333	1,641,667	1,700,000	1,500,000
Brought Forward—earned and unearned on writings of current year January to July.					350,000	850,000	350,000	850,000	350,000	850,000	350,000	850,000	350,000	850,000	350,000	850,000
Brought Forward. Total 6 months		1,200,000	350,000	850,000												
July	Short															
	1 year	83,334	41,667	41,667												
	2 "	16,666	4,166	12,500												
	3 "	25,000	4,167	20,833												
	4 "	33,333	4,166	29,167												
	5 "	41,667	4,167	37,500												
	Long															
Total for mo.		200,000	58,333	141,667	58,333	141,667	58,333	141,667	58,333	141,667	58,333	141,667	58,333	141,667	58,333	141,667
Aug.	Short															
	1 year	83,334	41,667	41,666												
	2 "	16,666	4,167	12,500												
	3 "	25,000	4,167	20,833												
	4 "	33,333	4,167	29,167												
	5 "	41,667	4,166	37,500												
	Long															
Total for mo.		200,000	58,334	141,666			58,334	141,666	58,334	141,666	58,334	141,666	58,334	141,666	58,334	141,666
Sept.	Short															
	1 year	83,334	41,667	41,667												
	2 "	16,666	4,166	12,500												
	3 "	25,000	4,167	20,833												
	4 "	33,333	4,166	29,167												
	5 "	41,667	4,167	37,500												
	Long															
Total for mo.		200,000	58,333	141,667					58,333	141,667	58,333	141,667	58,333	141,667	58,333	141,667
Oct.	Short															
	1 year	83,334	41,667	41,666												
	2 "	16,666	4,167	12,500												
	3 "	25,000	4,167	20,833												
	4 "	33,333	4,167	29,167												
	5 "	41,667	4,166	37,500												
	Long															
Total for mo.		200,000	58,334	141,666							58,334	141,666	58,334	141,666	58,334	141,666
Nov.	Short															
	1 year	83,334	41,667	41,667												
	2 "	16,666	4,166	12,500												
	3 "	25,000	4,167	20,833												
	4 "	33,333	4,166	29,167												
	5 "	41,667	4,167	37,500												
	Long															
Total for mo.		200,000	58,333	141,667									58,333	141,667	58,333	141,667
Dec.	Short															
	1 year	83,334	41,667	41,667												
	2 "	16,666	4,167	12,500												
	3 "	25,000	4,167	20,833												
	4 "	33,333	4,166	29,167												
	5 "	41,667	4,166	37,500												
	Long															
Total for mo.		200,000	58,333	141,667											58,333	141,667
Total—12 mos.		2,400,000	700,000	1,700,000												
					1,400,000	3,200,000	1,600,000	3,200,000	1,800,000	3,200,000	2,000,000	3,200,000	2,200,000	3,200,000	2,400,000	3,200,000
Deduct—(each month) CANCELLATIONS—to date—unexpired portion.																
Deduct—(each month) RE-INSURANCE—to date—unexpired portion.																

earned each month. This sum is entered in the earned column of January, and in the unearned column of that month is inserted the amount of unearned premium liability at the close of the month obtained by deducting the $141,667 earned in January from the unearned on December 31st, $3,200,000. In like manner, at the close of February $283,333 will have been earned, and the unearned liability will stand $2,916,667—the unearned premium on policies in force at the beginning of the year decreasing each month at the rate of $141,667 per month.

Having carried the figures of earned and unearned premium on the old table through each of the months to the close of the year, the writings of each month are inserted in the small tables to the left, and the earned and unearned premiums are carried into the column for that month, computed on the basis of the earned and unearned as it would stand at the close of the year. The footing of the column of unearned, each month, will show the unearned premium liability as of that date, from which should be deducted the unearned premium of all cancellations and reinsurance; the cancellations and reinsurance being each kept, month by month, on the same form of table.

That the table is correctly arranged for showing accurate results is proven by the hypothetical business which has been applied to it. It is clear that a business which has completed its sixth year, the same amount being written each year, and a pro rata or one-twelfth portion each month, divided in the same manner as to terms, would show the same amount of unearned premium on any day or at the end of any month of the seventh year, exactly the same amount of renewal business going on the books each day, to balance the amount of old business expiring, and it will be seen that the table shows the same amount of unearned premium, $3,200,000, at every point.

In case of delayed reports from agents or other causes preventing the entering of the entire business of a month upon the table, allowance can be readily made for the fact, although the table will correct itself when these reports are subsequently entered; and as all outstanding monthly reports of agents are required in June and December of each year the adjustment of the figures will take place in the table itself.

Perhaps a word of further explanation is necessary to show why, in Table B, a table designed to show the amount of un-

earned liability each month, and, especially, at the half-year period of June 30th, the business written in the current year is entered earned and unearned—as it will stand *at the end of the year*, while, on the other hand, the old business in force at the beginning of the year is entered in the Table as a pro rata, one-twelfth earned, each month, of the total sum earned in the twelve, which would show one-half of the total earnings of the year as earned on June 30th. Of course, in the case of the current year's business there would be only an average of three months earned on June 30th, instead of six; but, on the other hand, of the total amount earned during the twelve months, out of the old business brought forward as unearned of previous years' writings, a *greater portion than one-half will be earned on June 30th*, the difference being exactly equal to the excess of earnings claimed for the current business, the two thus compensating or equating each other.

This arrangement of the Table not only simplifies the work of entering the current business so as to enable the Company to make the computation as of the end of the year, for the annual statement, but, also, economizes the time and labor of computing the earnings on the old business—which would be a much more difficult task and herein lies the chief merit of the Table.

Take the case of annual business, for example, written in the previous year, of which one-half would remain unearned, at the beginning of the new year; instead of one-half of this remainder being earned June 30th, for example, as entered in Table B, *three-fourths* of it will be earned, and the entry of it as only one-half earned exactly balances the entry of the current annual business as six months earned instead of three months. It should be remembered that, in the case of annual policies, the average date of commencement is July 1st of the year of writing, and the average date of expiration is July 1st of the second year. The following Table will explain this more clearly. Let us suppose, for example, that an annual premium of $24 was written in each of the twelve months of the year 1887 and renewed in each of the first six months of the current year 1888. The average earning of the premiums written in a month is one-half of the month, or one-twenty-fourth of a year. At the end of 1887, therefore, 23-24 of the January business will have been earned and 1-24 will be carried to the new year as unearned. In like manner, of the business written in February, 21-24 will

be earned at the end of the year and 3-24 will remain unearned. It will be observed in the table that, of the total premiums written during the previous year, ($288.) one-half, or $144, will be unearned at the beginning of the new year. On June 30th of the new year there will have been six months, or 12-24, earned of the writings of the previous year. There being less than 12-24 remaining unearned of business written in the first six months of the previous year, all of the unexpired writings of January to June 30th will have been earned, and 12-24 of the writings of each of the months from July to December inclusive. This will make $108, or *three-fourths* of the amount ($144.), brought forward as unearned at the beginning of the year, instead of *one-half*, $72., the difference, $36., being exactly equal to the excess of earnings claimed in Table B on the writings from January to June (inclusive) of the new year, which would be entered as $72. earned instead of $36. Of course, this being true of "one-year" business it will be proportionally true of the business of other terms. This simple arrangement of Table B thus accurately equates the old business with the new and saves tedious and unnecessary calculations.

EARNINGS IN FIRST HALF OF YEAR ON THE ANNUAL BUSINESS WRITTEN IN PREVIOUS YEAR.

MONTH WRITTEN 1887	PREM.	Earned During the Year 1887.		Unearned at end of 1887.		Earned in First Half of 1888.	
		Frac'n.	Amt.	Frac'n.	Amt.	Frac'n.	Amt.
Jan.	$ 24.	$\frac{23}{24}$	$23.	$\frac{1}{24}$	$ 1.	$\frac{1}{24}$	$ 1.
Feb.	24.	$\frac{21}{24}$	21.	$\frac{3}{24}$	3.	$\frac{3}{24}$	3.
Mch.	24.	$\frac{19}{24}$	19.	$\frac{5}{24}$	5.	$\frac{5}{24}$	5.
April.	24.	$\frac{17}{24}$	17.	$\frac{7}{24}$	7.	$\frac{7}{24}$	7.
May.	24.	$\frac{15}{24}$	15.	$\frac{9}{24}$	9.	$\frac{9}{24}$	9.
June.	24.	$\frac{13}{24}$	13.	$\frac{11}{24}$	11.	$\frac{11}{24}$	11.
July.	24.	$\frac{11}{24}$	11.	$\frac{13}{24}$	13.	$\frac{12}{24}$	12.
Aug.	24.	$\frac{9}{24}$	9.	$\frac{15}{24}$	15.	$\frac{12}{24}$	12.
Sept.	24.	$\frac{7}{24}$	7.	$\frac{17}{24}$	17.	$\frac{12}{24}$	12.
Oct.	24.	$\frac{5}{24}$	5.	$\frac{19}{24}$	19.	$\frac{12}{24}$	12.
Nov.	24.	$\frac{3}{24}$	3.	$\frac{21}{24}$	21.	$\frac{12}{24}$	12.
Dec.	24.	$\frac{1}{24}$	1.	$\frac{23}{24}$	23.	$\frac{12}{24}$	12.
	$288		$144		$144		$108

Popular errors as to increase and decrease of Unearned Premium Liability. It is quite common for underwriters to assume that the unearned premium liability of a Company will be increased or decreased at the end of the year in proportion as the amount of premiums written by the Company through the year are greater or less than the writings of the previous year. Under the same conditions—the same amount of premium receipts divided proportionally in the same manner as the premium receipts of the six previous years—this would be the case. In term policies, however, the proportion of the annual receipts written in each term should be the same for all previous years, as to policies in force, to secure proportionate results.

As an illustration of how fallacious such estimates of unearned premium liability may be, let us suppose that during the sixth year (1887) of the hypothetical business (Table "A") exactly the same amount of premiums ($2,400,000) had been written, but that, instead of being divided as in the table, it had been divided as follows:

$1,300,000	of one-year business,
200,000	of two-year business,
270,000	of three-year business,
320,000	of four-year business,
310,000	of five-year business,
$2,400,000	

Computing the unearned, the problem would stand as in table "C" on following page. Thus showing that although the premiums do not exceed the writings of the previous year, being exactly equal in amount, the unearned premium liability, instead of being $3,200,000, has been *actually reduced* $116,000, and at the close of 1887 would have been only $3,084,000.

Right here we have a convenient illustration of the utter unreliablility of the average insurance chart for the purpose of showing the comparative conditions of Companies. The premium written by the Company during this year is $2,400,000 but the premium earned is $2,516,000, or $116,000 more than the premium written; let us now suppose that the losses incurred are $1,464,000; the percentage to written premium would be 61%. Let us suppose the expenses are $960,000, the percentage of expense to written premium being 40%. The Company's figures would be paraded in the charts as follows: Expenses, 40%;

6th YEAR. 1887. TABLE "C."

TERM.	PREMIUM.	EARNED.			UNEARNED.		
1 Year	1,300,000	$\frac{1}{2}$	650,000		$\frac{1}{2}$ of '87	650,000	650,000
		$\frac{1}{2}$ of '86	500,000	1,150,000			
2 "	200,000	$\frac{1}{4}$	50,000		$\frac{3}{4}$ of '87	150,000	
		$\frac{1}{2}$ of '86	100,000		$\frac{1}{4}$ of '86	50,000	200,000
		$\frac{1}{4}$ of '85	50,000	200,000			
3 "	270,000	$\frac{1}{6}$	45,000		$\frac{5}{6}$ of '87	225,000	
		$\frac{1}{3}$ of '86	100,000		$\frac{3}{6}$ of '86	150,000	
		$\frac{1}{3}$ of '85	100,000		$\frac{1}{6}$ of '85	50,000	425,000
		$\frac{1}{6}$ of '84	50,000	295,000			
4 "	320,000	$\frac{1}{8}$	40,000		$\frac{7}{8}$ of '87	280,000	
		$\frac{1}{4}$ of '86	100,000		$\frac{5}{8}$ of '86	250,000	
		$\frac{1}{4}$ of '85	100,000		$\frac{3}{8}$ of '85	150,000	
		$\frac{1}{4}$ of '84	100,000		$\frac{1}{8}$ of '84	50,000	730,000
		$\frac{1}{8}$ of '83	50,000	390,000			
5 "	310,000	$\frac{1}{10}$	31,000		$\frac{9}{10}$ of '87	279,000	
		$\frac{1}{5}$ of '86	100,000		$\frac{7}{10}$ of '86	350,000	
		$\frac{1}{5}$ of '85	100,000		$\frac{5}{10}$ of '85	250,000	
		$\frac{1}{5}$ of '84	100,000		$\frac{3}{10}$ of '84	150,000	
		$\frac{1}{5}$ of '83	100,000		$\frac{1}{10}$ of '83	50,000	
		$\frac{1}{10}$ of '82	50,000	481,000			1,079,000
	2,400,000		2,516,000	2,516,000		3,084,000	3,084,000

Losses incurred, 61%; Total, 101% of premiums; and the impression conveyed would be that the Company had gone behind in its profit and loss account. On the contrary, the correct statement of the Company's business for the year would be as follows:

Premiums earned,		$2,516,000
Losses incurred (58¼% of earned Prem.)	$1,464,000	
Expenses, (38% of earned Premiums)	960,000	2,424,000
Excess of earned Premium over loss and expense,		92,000

showing a net profit on the Premium account of *ninety-two thousand dollars*. To this should be added the interest, at 4½ per cent., on the unearned premium reserve, $3,084,000 (less, say, 10% of premiums written for premiums unpaid, leaving an interest-bearing balance of $2,844,000) or $127,980, which added to the excess of earned premiums over losses and expenses before stated of $92,000, would show a trade profit of $219,980.

Could a clearer instance be presented of the misleading character of tables published year after year for the instruction of the public by compilers who do not understand their own statistics. A correct comparative table is one which shows the *earned* premium of each company, the expenses and losses incurred, and the interest at the average rate per cent. obtained for the year on the unearned premium fund after deducting therefrom the unpaid premiums. Such a table would place all companies on the same basis, and show the exact trade profit of the year from an underwriting standpoint. It is the only basis on which companies should be compared. It is the only account which would correctly show whether they have made or lost money on the year's transactions. And yet, who ever saw such a table, either in writing or print!

Now let us suppose that the business of 1887 instead of being $2,400,000, the exact amount of the previous year, had been $10,000 less, or $2,390,000, the natural assumption would be that the unearned premium liability would be less. If the business, however, were divided as follows:

$800,000	of one-year business,
200,000	of two-year business,
330,000	of three-year business,
440,000	of four-year business,
620,000	of five-year business,
$2,390,000	

the problem would stand as per table "D", which shows that with a decrease in writings of $10,000 from the previous year, the unearned premium fund has *actually increased nearly seven times that amount*, or $68,000.

On the contrary, owing to a different division of the business as to terms, a premium income materially *larger* than that of a preceding year may actually show a *decrease* in unearned premium liability; for example, let us suppose that the premiums for 1887, instead of being $2,400,000, were $2,530,000, a larger writing by $130,000, divided as follows:

$1,400,000	of one-year business,
200,000	of two-year business,
270,000	of three-year business,
360,000	of four-year business,
300,000	of five-year business,
$2,530,000	

The problem would stand as in table "E":
And it will be seen that while the premiums written are $130,000 more than for the previous year, the unearned premium liability at the close of the year is actually $40,000 *less than at the beginning of the year.*

It requires only a careful examination of the term tables to see the explanation of this. Take the five-year table, for example, in the last mentioned problem. The five-year business written is $300,000, but owing to the fact that $500,000 a year had been written in each of the five previous years, one-fifth of which would be earned in 1887, the earnings (including the remaining tenth of 1882) would be $480,000—an excess of earnings over writings of $180,000.

In like manner, the earnings on the three and four year tables exceed the writings on those terms, and the combined gain in earnings on these three terms exceeds the increased unearned on the one-year business, the difference being $40,000—the amount of reduction in the reinsurance fund.

These illustrations will suffice to show that the increase or decrease of a Company's business is not a safe test of the condition of its unearned premium liability, and that the most careful scrutiny should be kept of a Company's business, month

6th YEAR. 1887. TABLE "D."

TERM.	PREMIUM.	EARNED.			UNEARNED.		
1 Year	800,000	1/2	400,000		1/2 of '87	400,000	400,000
		1/2 of '86	500,000	900,000			
2 "	200,000	1/4	50,000		3/4 of '87	150,000	
		1/2 of '86	100,000		1/4 of '86	50,000	200,000
		1/4 of '85	50,000	200,000			
3 "	330,000	1/6	55,000		5/6 of '87	275,000	
		1/3 of '86	100,000		3/6 of '86	150,000	
		1/3 of '85	100,000		1/6 of '85	50,000	475,000
		1/6 of '84	50,000	305,000			
4 "	440,000	1/8	55,000		7/8 of '87	385,000	
		1/4 of '86	100,000		5/8 of '86	250,000	
		1/4 of '85	100,000		3/8 of '85	150,000	
		1/4 of '84	100,000		1/8 of '84	50,000	835,000
		1/8 of '83	50,000	405,000			
5 "	620,000	1/10	62,000		9/10 of '87	558,000	
		1/5 of '86	100,000		7/10 of '86	350,000	
		1/5 of '85	100,000		5/10 of '85	250,000	
		1/5 of '84	100,000		3/10 of '84	150,000	
		1/5 of '83	100,000		1/10 of '83	50,000	
		1/10 of '82	50,000	512,000			1,358,000
	2,390,000		2,322,000	2,322,000		3,268,000	3,268,000

6th YEAR. 1887. TABLE "E."

TERM.	PREMIUM.	EARNED.			UNEARNED.		
1 Year	1,400,000	$\frac{1}{2}$	700,000		$\frac{1}{2}$ of '87	700,000	700,000
		$\frac{1}{2}$ of '86	500,000	1,200,000			
2 "	200,000	$\frac{1}{4}$	50,000		$\frac{3}{4}$ of '87	150,000	
		$\frac{1}{2}$ of '86	100,000		$\frac{1}{4}$ of '86	50,000	200,000
		$\frac{1}{4}$ of '85	50,000	200,000			
3 "	270,000	$\frac{1}{6}$	45,000		$\frac{5}{6}$ of '87	225,000	
		$\frac{1}{3}$ of '86	100,000		$\frac{3}{6}$ of '86	150,000	
		$\frac{1}{3}$ of '85	100,000		$\frac{1}{6}$ of '85	50,000	425,000
		$\frac{1}{6}$ of '84	50,000	295,000			
4 "	360,000	$\frac{1}{8}$	45,000		$\frac{7}{8}$ of '87	315,000	
		$\frac{1}{4}$ of '86	100,000		$\frac{5}{8}$ of '86	250,000	
		$\frac{1}{4}$ of '85	100,000		$\frac{3}{8}$ of '85	150,000	
		$\frac{1}{4}$ of '84	100,000		$\frac{1}{8}$ of '84	50,000	765,000
		$\frac{1}{8}$ of '83	50,000	395,000			
5 "	300,000	$\frac{1}{10}$	30,000		$\frac{9}{10}$ of '87	270,000	
		$\frac{1}{5}$ of '86	100,000		$\frac{7}{10}$ of '86	350,000	
		$\frac{1}{5}$ of '85	100,000		$\frac{5}{10}$ of '85	250,000	
		$\frac{1}{5}$ of '84	100,000		$\frac{3}{10}$ of '84	150,000	
		$\frac{1}{5}$ of '83	100,000		$\frac{1}{10}$ of '83	50,000	
		$\frac{1}{10}$ of '82	50,000	480,000			1,070,000
	2,530,000		2,570,000	2,570,000		3,100,000	3,160,000

by month, through each department of its territory, since a change of the Company's business into term policies in any one department, might be seriously increasing the unearned premium liability at the very moment when the fact that the total business of the Company was not in excess of the previous year's writings might lead its officers to suppose that its reinsurance fund was keeping even pace with its income. The five-year business, for example, although less than the writings of the previous year would show an increase of unearned premium liability unless an equal amount had been written in each of the previous years, and other terms in proportion. It is, therefore, only in the case of an annual business that the unearned premium fund is proportionately increased or decreased according as the writings of the year are greater or less than those of the previous year.

Is term business profitable? That depends entirely upon the rate obtained, it being assumed that the same care is used in selection as in the case of annual business. It should be borne in mind that inspections are naturally less frequent on long term risks than in the case of annual business, owing to the fact that the risks do not come up for renewal annually. For this reason, mercantile and manufacturing risks ought not to be written for terms of three and five years unless a Company's system of supervision secures the same scrutiny annually as in the case of one year policies. In the case of dwellings and farm property of permanent occupation—a class of property not liable to change in use or occupancy—there is less objection to a term policy.

The operation of a five-year business is to show an apparent loss during the first half of the term and an accumulation of unearned. An examination of a five-year business will show, as before explained, that a larger percentage of losses occur in the earlier years of the term than in the later years. Assuming the loss for the full term to be 50% of the premium written, for example, it will be found that this 50% loss will be distributed throughout the five years of the term in about the following percentages:

16%	in the	1st	year, or	8%	of the	premium	written.
24%	"	2nd	"	12%	"	"	"
18%	"	3rd	"	9%	"	"	"
17%	"	4th	"	$8\frac{1}{2}$%	"	"	"
16%	"	5th	"	8%	"	"	"
9%	"	6th	"	$4\frac{1}{2}$%	"	"	"
100%				50%			

As the earned premium of the first year is only $\frac{1}{10}$ of the premium written, and as 16% of a 50% loss incurred in this year would equal 8% of the premium written, the loss in the first year is 80% of the *earned* premium.

Table "F" will show the operation of a five-year business, taking into account the expenses, estimated at 37% for commissions, salaries, taxes, etc., and the losses distributed as above, viz:

						Earned Prem.	Loss.
Loss	1st	year	80%	of earned	premium,	$10.00	$ 8.00
"	2nd	"	60	"	"	20.00	12.00
"	3rd	"	45	"	"	20.00	9.00
"	4th	"	$42\frac{1}{2}$	"	"	20.00	8.50
"	5th	"	40	"	"	20.00	8.00
"	6th	"	45	"	"	10.00	4.50
						$100.00	$50.00

Cancellations between the first year and expiration would slightly modify these figures.

Of course on a term business extending over six years, the lower percentages of previous years would balance the higher percentages of later years, and the percentage of 50% loss to earned premium, carrying policies to expiration, would be maintained by the average. In the case of a Company commencing a term business, or of one unduly increasing its term business, however, this peculiar feature of term business would prove expensive.

Profit and loss account of a five-year business. The following table "F" shows the practical working of a five-year term business applying to it the feature of excessive losses in the earlier years of the policies as above explained. Assuming that a $100,000 five-year business should be commenced in 1888, one-

TABLE "F."

YEAR.	PREMIUM.	EARNED PREMIUM & INTEREST.			EXPENSES AND LOSSES.			GAIN.	DEFICIT.	Unearned Premium.	Unpaid Premium.	Int. Bearing Balance.
1st Year	100,000	$\frac{1}{10}$	10,000		Exp. say 37% of Prem. written	37,000						
1888.					Losses 80% of Earned	8,000	45,000		35,000	90 000	10,000	80,000
2nd Year	100,000	$\frac{1}{10}$	10,000									
1889.		$\frac{1}{5}$ of 1888	20,000	30,000	Exp. say 37% of Prem. written	37,000						
		Int. 4½% on	80,000	3,600	Losses 80% of 1889 earnings,	8,000						
				33,600	60% of 1888 "	12,000	57,000		23,400	160,000	10,000	150,000
3rd Year	100,000	$\frac{1}{10}$	10,000									
1890.		$\frac{1}{5}$ of 1889	20,000									
		$\frac{1}{5}$ of 1888	20,000	50,000	Exp. say 37% of Prem. written	37,000						
		Int. 4½% on	150,000	6,750	Losses 80% of 1890 earnings,	8,000						
				56,750	" 60% of 1889 "	12,000						
					" 45% of 1888 "	9,000	66,000		9,250	210,000	10,000	200,000
4th Year	100,000	$\frac{1}{10}$	10,000									
1891		$\frac{1}{5}$ of 1890	20,000									
		$\frac{1}{5}$ of 1889	20,000									
		$\frac{1}{5}$ of 1888	20,000	70,000	Exp. say 37% of Prem. written	37,000						
		Int. 4½% on	200,000	9,000	Losses 80% of 1891 earnings,	8,000						
				79,000	" 60% of 1890 "	12,000						
					" 45% of 1889 "	9,000						
					" 42½% of 1888 "	8,500	74,500	4,500		240,000	10,000	230,000

tenth, or $10,000, would be earned at the end of that year. The expenses at, say, 37 per cent. of premiums, would be $37,000. The losses, 80 per cent. of the earned, would be $8,000. Total outgo, $45,000; total income, $10,000; deficit, $35,000. The unearned premium fund would stand at the end of the year $90,000; from which deduct, say, 10 per cent. of premiums written for premiums unpaid, would leave $80,000 of quick assets, on which it may be supposed the Company would receive in the following year, say $4\frac{1}{2}$ per cent. interest, $3,600. During that year it would write another $100,000 of premiums, and would earn one-tenth of the amount, $10,000; also one-fifth of the previous year, $20,000; the total income would be $33,600, as against an outgo of $57,000 calculated as follows:—$37,000 for expenses; losses, 80 per cent. of the earnings on policies written that year, $8,000, and 60 per cent. of the earned of the previous year, ($20,000) $12,000—Total outgo, $57,000, as against $33,600 of income; leaving a deficit at the end of the year of $23,400, with the unearned increased to $160,000 and an interest-bearing, quick asset balance of $150,000. Of course, to be more accurate, the interest-bearing balance would be diminished by the cash payments for losses and expenses for average time from date of payments, but in table "F" the five-year business has been given the full benefit of an unearned premium fund intact.

At the end of the third year, computed on the same basis, as will be seen by the table, the company will have a deficit of $9,200. It is not until the end of the fourth year, it will be observed, that the account begins to change and a gain of $4,500 of income over outgo is realized. It is evident that a company must draw upon its net surplus to purchase a five-year business for the first three years of the term, and until it has sufficient business upon its books to reach the point where the earned premium and interest income exceeds the loss and expense outgo.

It will be observed that it is, therefore, not until the fourth year that the company—aside from the value of its accumulated unearned premium—begins to show any profit; and whether it can show any profit then or thereafter depends entirely on the adequacy of the rate. In the above table the premium is computed at a rate double the fire loss. If the rate be so low that

the fire loss is above 50 per cent., a correspondingly less favorable result will be reached.

Many underwriters, without reflection, fall, not unnaturally, into the error of supposing that, in writing a term business, the company has an advantage from collecting the entire premium for the term in advance, and a much larger amount of interest than in the case of annual policies. This assumption, however, is an incorrect one. It loses sight of the important fact as already stated that as the premiums of annual policies are paid each year, in advance, the interest account is but little less than that received on the five-year plan. The following (written by me) appeared in the New York Daily Commercial Bulletin in March, 1886, shows the fallacy of the argument.

It seems to us that the companies making an effort to secure term business, especially on the basis of two annual premiums for three-year policies, and of three annual premiums for five-year policies, are not making proper estimates as to the interest account, which is supposed, in the case of term policies, to make up for the substantial reduction in rate. Companies doing a term business, for example, are apparently assuming that the interest account runs only in favor of term policies—at least this is the only supposition on which we can account for their readiness to accept such policies at the material discounts from annual rates. While the risk is kept in force for a term of five years, by annual policies written each year, is it not clear that the interest on the premium for the first year, the first fifth of the term, is secured for the whole five years: that for the second year, for four years; that for the third year for the three years etc.,?

Trade Profit of a Fire Insurance Company. The Trade Profit of a Fire Insurance Company for any given year is calculated in the following manner:

From the Premiums earned during the year are deducted the Expenses and Losses incurred during the year, and to the remainder is added the interest, at the average rate received during the year, on the unearned premium fund, deducting first therefrom the unpaid premiums. An illustration of the problem will be found on pages 228 and 230. Practically all of the interest income received on net surplus of the Company and

especially that on the unearned, excepting legal interest on the cash capital, belong to the "trade profit;" but as the net surplus is the accumulation of previous years, the interest upon it ought not to enter into the "trade profit" of a single year.

While it is not the practice of Companies, owing to requirements of State Departments, to take credit for such expenses as commissions paid to agents, &c., on the amount of premiums carried to the unearned premium fund, such expenses, paid on unearned premiums on desirable business and at adequate rates, may justly be regarded by the Company itself as a judicious investment, notwithstanding their exclusion from the profit and loss account.

Let us suppose, for example, that a Company writing term business, on desirable risks at full rates, should increase its unearned premium fund, say $200,000, paying to agents a commission, at 15 per cent., or $30,000, such cash outlay might certainly be taken into account as of the nature rather of an investment, being recoverable when the risks have been carried to expiration. As no provision, however, can be made by State Departments to determine the value of such unexpired risks, any expenses paid on them are properly excluded from an asset statement.

It seems incomprehensible that, to this date, all insurance charts, department reports and advertisements of companies persist in exhibiting the percentage of incurred loss to received premium. Indeed, in many of the charts the columns headed "Premiums" and "Losses" fail to indicate whether the compiler means premiums *written* or *collected*, (they never mean premiums *earned*) or whether he means losses *incurred* or *paid*. Surely the day cannot be far distant when all reports will concur in showing what alone tells the story of a company's profit or loss—the percentage of *incurred loss* to *earned* premium *and expense* to written premium.

It will require but a moment's demonstration to show that absolutely nothing definite can be determined from the usual tables, which ignore the different quantities of old and new business and of annual and term policies. Let us take a supposable and simple case in point. Company A, with a business of a million dollars of one-year premiums, at the end of a term

of four years, stops writing five-year policies, of which it has taken in each of the four years, five hundred thousand dollars in premiums. At the commencement of the fifth year it would have in its unearned premium fund (not taking into account the small percentages of cancellations) twelve hundred thousand dollars of unearned five-year premiums. During the fifth year it would receive one million dollars from one-year policies, and would earn four hundred thousand dollars of the premiums of its five-year business, making a total earned premium of $1,400,000. If the losses incurred during the year should amount to seven hundred thousand dollars, all the wiseacres of the business would comment upon a loss ratio of seventy per cent. of its premium receipts, whereas its loss ratio as to earned premiums would be only fifty per cent., and it would be in an exceedingly healthy condition.

On the other hand, a Company just commencing a five-year business might show a larger annual income and a smaller apparent percentage of loss, and yet, by all the rules of arithmetic, be actually on the road to destruction and bankruptcy at a hand gallop. Let us take a case in point. Company B, doing a business of one million dollars annually in one-year policies, commences a five-year business and secures five hundred thousand dollars of premiums on this class the first year. Its premium receipts for the year will be $1,500,000. If its losses incurred are $750,000, all of the aforesaid wiseacres will express themselves as satisfied with a result which shows a loss of only 50 per cent. of its receipts in premiums; whereas the portion of its premiums earned—the only portion which belongs to the Company and not to its policyholders—is $1,050,000; its losses are clearly over seventy-one per cent. and its business is an unprofitable one. And yet, in every Insurance Report and Chart throughout the country, Company A and Company B will be compared on a basis favorable to the latter and unfavorable to the former. Could there be a more stupendous farce than this column in the charts showing the percentages of incurred loss to received premium as the true test of successful management!

An instance in point happened within a few years. A company commenced a five-year dwelling and farm business in a certain State, and received fifty thousand dollars in premiums on this class. Its losses were only seven thousand dollars, and

it was held up as an example of intelligent management and successful enterprise, whereas the portion earned of its fifty thousand dollars was only one-tenth of the amount, or five thousand dollars, and its losses were, in fact, 140 per cent. of its premiums. Making all due allowance for the well-known fact that a large portion of the physically and morally bad risks of a class burn during the first year of its term, the company in question is not to be envied its task of carrying these policies to expiration. It may safely be assumed that if the losses on the first year of a five-year business exceed 90 per cent. of the earned premium, the rate at which the business has been taken is inadequate.

Some underwriters rely on the percentage of fire loss to the amount of unearned premiums. This popular test is approximately reliable only in the case of a Company at least five years old, doing an even, steady business, and not materially increasing its term acceptances. Such a Company's annual losses ought not to be above 80% of its unearned fund; if they are, the reserve is probably not large enough, although this depends, as before explained, largely upon the manner in which its premium writings are divided as to terms.

Ingenious attempts are made from time to time to demonstrate the unprofitableness, in the past, of Fire Insurance as a business, by tables of statistics which cover the business of all Companies, and in which the compiler is careful to include all of the Companies who have lost money or failed through mismanagement or otherwise. It is only a small percentage of those engaged in any business who succeed; and it is as unfair to the business of Fire Insurance to include in tables intended to show the results of the business those Companies that have failed for want of judgment, knowledge or ability, as it would be to claim that the Dry Goods business, in which such houses as Claflin & Co., Marshall Field & Co., and others, have accumulated fortunes, is an unprofitable business because of the failures of thousands who have lost money in that calling. It may safely be assumed that the business of Fire Insurance is a legitimate business; the indemnity, which is the commodity dealt in, being a necessity to the property-owner; and that the business of insurance conducted by expert underwriters, over a large territory, which makes them independent of the fluctuations of prices in any

given locality, is, and always will be, a profitable one. If competition should result, for a period, in low prices, the survivors of the contest will reap a harvest, after the weak are disposed of, which will bring the profits to a fair average.

PROFITS OF THE INSURANCE BUSINESS.

In view of the very simple process of determining the excess of "earned premium" over "incurred loss and expense," or the deficit, as already explained, it seems strange to me that some State Insurance Departments should pursue the roundabout, tedious and unnecessary process of reaching it through the ledger accounts of insurance companies reporting to them. As well might a grocer go into quantitative and qualitative analysis in selling sugar, instead of weighing it upon his counter scales.

Anyone taking the annual Insurance Report for a State—that of New York, for example—can quickly determine just how much any company has made or lost on its business proper, irrespective of its interest income account. To determine the "premium written," it is only necessary to take the premiums received during the year and add any excess of the "unpaid premiums in course of collection," to be found in the "Asset" paragraph, or deduct any decrease of this item at the end of the year as compared with its beginning.

For example, suppose a company collects during the year in premium $1,000,000, and has $200,000 "gross premiums in due course of collection" at the close of the year as compared with $100,000 at the beginning of the year, its "premiums written" would be just $1,100,000. If, now, it has increased its "unearned premium liability"—a fact which may be determined by comparing the amount of its reserve for "unearned premiums" with the amount at the beginning of the year—the excess should be deducted from the written premiums. This would give the "earned premiums." If the "unearned premium liability" has decreased, the amount of decrease should be added to the written premium, to obtain the "earned premium."

For example, suppose the company writing $1,100,000 premium increases its "unearned" $200,000 as compared with the

beginning of the year (This it might easily do when writing a term business) its "earned premium" would be $900,000. If, however, it had reduced its "unearned premium liability" $200,000, its "earned premium" would be $1,300,000.

In like manner the "losses incurred" (and these may be more or less than the "losses paid") can be determined by adding to the "losses paid" any increase in the amount of "unpaid" at the end of the year as compared with the amount unpaid at the beginning of the year; deducting, on the other hand, any decrease in the liability for "unpaid losses." For example, if the "losses paid" are $500,000, and the "losses unpaid" are $100,000 as compared with $50,000 at the beginning of the year, the company has clearly incurred losses during the year of $550,000.

To the "incurred losses" should be added the "incurred expenses," which may be determined in the same manner, by adding to the amount paid for expenses during the year, the increase of the "reserve for unpaid expenses," or deducting any decrease.

The sum of the two, "incurred loss" and "incurred expenses," will indicate a profit if it is less than the "earned premiums," and will indicate a loss if in excess of the "earned premiums."

Every insurance agent can easily demonstrate to property-owners that the rates of the past five years (1896–1902 have not been as high as the increase in assets and net surplus of companies as shown by statements would indicate. The increases in these two items have been largely (in the year 1901 entirely) due to the amount received for interest on invested assets, and to the increase in the market values of securities owned by the companies, such as real estate, stocks, bonds, etc. It is quite probable that much of the unfounded opposition to rates of insurance companies and much of the burdensome legislation imposed upon them is due to assuming that rates are exorbitant because of increases of surplus, which may have been obtained entirely from what might be called the banking or financial side of the account; and the companies are themselves largely to blame for this natural misconstruction placed upon their advertised statements.

Percentage of Expense. The percentage of expense to premium, when intended to show the cost of securing business or for comparison of the expense ratios of various companies, should be

computed on the premiums *written*, rather than upon the premiums *collected* or premiums *earned*, for the very obvious reason that the expense of getting business, especially in brokerage and commissions to agents, increases in proportion to the policies written or issued, rather than upon the premiums collected or earned. The collections for a given year may not be greater than those of the previous year, whereas the amount written may largely exceed that of the preceding year—a fact which is also true of the earned premium, which on a term business may be much less than the written premium. All of the expenses on the written premium have to be charged off, under the insurance laws of the various States, and might, on a business, as already explained under "Unearned Premium," indicate an actual loss, whereas if the business purchased is profitable, and the investment of advanced commission and brokerage a good one the company might really be in the most profitable condition while showing a loss of net surplus. It would be as unjust to claim that a company had lost money because it had thus accumulated unearned premium on desirable property, at adequate rates, by paying for it in advance, as to claim that a farmer had lost money whose entire crop remained unsold in his barns.

WATER WORKS AND PIPE DISTRIBUTION.

(The following pages have been printed in pamphlet form for the use of citizens contemplating the introduction of water works.)

The best system of water-works for fire-extinguishing purposes is a gravity system, with the reservoir at a sufficient elevation to ensure, with full draught, an effective head or pressure, *at the hydrants*, of 80 lbs. to the square inch or not less than 40 lbs. to the square inch at the base of the nozzle with 250 feet of hose.

The force of gravity acting with an ample reservoir differs from pump pressure for forcing water through pipes, in the important respect that it is always ready for instant use without notification by means of electric wires, telephones, etc., and is not liable to break down or get out of order like pumps or other direct pressure appliances. It, moreover, exerts, at all times, a steady pressure on the pipe system, reducing the liability of breakage to a minimum. A gravity system, if pipes are of proper size, has a decided advantage over a direct pressure pumping system in that the full volume of flow is instantly available without waiting to fire up extra steam boilers.

To secure an effective head or pressure, the reservoir should be elevated about 200 feet above the general level of the city and near enough to prevent serious loss of head by friction in long lines of supply mains. Such an elevation is, of course, not often found near a city; where it is, no other system should be considered as a substitute for pressure purposes. There should be two force or delivery mains of heavy cast-iron pipe leading into the general network of pipes within the city, so that at least one pipe will always be available in case workmen are repairing the other or cutting branches upon it;* and these mains should be of such ample size that not more than twenty feet

*They should be separated by twelve feet or more, so that one breaking could not undermine and break the other.

head will be lost by friction even when the full number of hydrant streams are in play. A single line of supply main is especially objectionable if of the so-called cement lined variety, which consists of a thin sheet of wrought iron, covered with cement mortar, and which after ten or fifteen years is liable to be broken by rust and is, at any time, liable to be instantly ruined by a stroke of lightning.

Four important but simple considerations need to be kept in mind for understanding the dynamics of water pressure, or what is known as Hydrodynamics, and also for understanding the science of the flow of water through pipes and the raising of water to various heights, which is known as Hydraulics. The science which treats of quiet water or water at rest as in a reservoir being the science of Hydrostatics. These considerations are as follows:

First. Water like other liquids, exerts equal pressure in all directions, owing to the fact that its molecules move freely over and upon each other. Pressure exerted upon water in a hollow ball with numerous perforations would expel the water from all of the perforations with equal force. This, it need not be explained, is the principle of the hydraulic press, where the pressure of a small pipe of water exerted over a wide surface shows the same pressure for every square inch of such wider surface. It is the principle upon which an inch pipe inserted tightly in a barrel full of water will burst the barrel when the water reaches a certain height in the pipe, although the weight of water in the pipe may be trifling.

Second. Water, like any solid, has a known weight for a given quantity.

Third. Water will flow with greater or less velocity through pipes according to the pressure exerted upon it, which pressure may be simply that of its own weight, due to its elevation above the point of escape from the stored body, or the pressure exerted by a force pump.

Fourth. Water, like a solid, in motion is subject to the retardant effect of friction of its surface against the surfaces rubbed against. Consequently, water flowing through a pipe is retarded in its flow by the friction of its particles on the sides of the pipe—what is known as "skin friction," naturally greater in rough interiors of pipes than in new, smooth pipes.

The law of equality of pressures, known as Pascal's Law, is as follows: Pressure exerted anywhere upon a mass of liquid is transmitted undiminished in all directions and acts with the same force on all equal surfaces and in a direction at right angles to those surfaces.

The pressure upon water due to the elevation of the supply as in a reservoir, or in a standpipe, is the pressure exerted by the weight of the water and, therefore, corresponds to its height as already explained.

Water would issue from an orifice one hundred inches below the surface with ten times the velocity with which it would issue from an orifice one inch below the surface; but this maximum pressure would be exerted only at exactly the foot of the column, *i. e.* the bottom of the reservoir. If the pressure should be tested at any point distant from the reservoir it would be found to be diminished according to the distance and according to the size of the pipe conveying it to that distance, for it would lose head by reason of the retardant effect of friction on the sides of the pipe, which is greater in small pipes than in large pipes, and greater where the flow of the water, or its velocity, is rapid than where it is slow and greater also in rough than in smooth pipes. This loss of head is known among engineers as the loss by "frictional head."

A familiar illustration of the whole matter would be that of a barrel full of water. If a hole should be bored at the bottom of the barrel, water would run from it with greater force than from a hole bored near the top, the difference in pressure being due to the weight of the water above the centre of the hole.

Obviously water would flow with less loss of pressure through a large pipe than through a smaller one just as it would through a three-inch hose as compared with an inch hose of the same length, the difference being due to the greater friction in the smaller of the two pipes.

Liquids, like solids, are affected in their motion by friction, as already explained. The inertia of a body, or its tendency to remain at rest or to continue in motion unless acted upon by some force is, in the case of its being in motion, affected by friction.

The head of a body of water at rest in a reservoir is known

as the "static head" and, of course, is the maximum head or pressure which it would show the instant the reservoir is tapped and before any force is lost by friction in pipes. It must, therefore, be always greater than the head or pressure in the pipes at various distances from the reservoir and always greater than after a number of streams, like hose streams, have been set in flow.

As water weighs 62.4 lbs per cubic foot, hereafter explained, this fact being known, the "head" or pressure of water may be computed for any point when the height of the water above that point and the intermediate lateral distance are known.

For example, a reservoir 80 feet high would exert a pressure in pounds per square inch at the bottom of the reservoir of 34.65 lbs. per square inch. At a point one mile from the bottom of the reservoir the pressure would be reduced by the loss in frictional head at the rate hereinafter explained.

Any discussion of water-works for fire-extinguishing purposes would waste time in treating of those matters which usually, from the standpoint of potableness, occupy so much space in engineering works on hydraulics, such as filtration, etc., etc. It makes little difference by what means, natural or artificial, by springs or rainfall or water-sheds or pumps, the water is impounded at the elevation needed. If ground at 200 feet elevation is not available, or if the elevated reservoir is necessarily at considerable distance from the centre of the town, so that but 50 lbs. pressure, from the gravity supply, for instance, is available, then it may happen to be a decided advantage to have the supply pumped to the reservoir from some neighboring river or lake, for then, in case of a great fire, the pumps can supplement the reservoir supply by direct pumping at a higher pressure. The pumps being connected with the street mains with a check-valve to prevent backward flow to the reservoir, a combined "gravity" and "direct-pressure" system would be secured. Where drainage or water shed area is relied upon, the impounding reservoir should be of sufficient capacity to supply the maximum domestic demand and fire draft during a season of drought. The distributing reservoir, also, should be large enough for several days' domestic consumption, and with a sufficient reserve in addition for fire purposes. In some

instances distributing reservoirs are large enough only to supply a day's average demand for domestic purposes, and a break in one or both of the supply mains, or stoppage for necessary repairs, may leave the city without water.

Where a gravity supply is insufficient and the system is reinforced by direct pumping from a neighboring river or lake, it should be remembered that while this reserve may be excellent for purposes of domestic supply it may prove unreliable in case of an extensive conflagration unless such pumping system is so arranged and managed as to bring the reserve plant into full action whenever needed—a feature of such duplex systems which should always be carefully investigated.

Where the lay of the land does not permit of an elevated reservoir and reliance is necessarily placed upon direct pumping systems and standpipes, direct pumping, or the so-called Holly system, has given excellent service in many cases; in other cases it has failed to respond properly, and since of necessity it must depend upon some device to transmit the alarm of fire and a notification that extra pressure is needed, and relies, moreover, on there being a surplus of steam and a pump capacity available instantly, it cannot compare with first-class reservoir service in point of security.

If the pumping station on the Holly system is in close proximity to the city (but not liable to be destroyed by a conflagration) it is more reliable than when several miles distant. There should be duplicate pumping engines—three would be better still—with at least three force mains.

The pumping station should be connected electrically with the Fire Department, so that when an alarm of fire is received at the engine-house the intelligence will reach the pumping station at the same moment.

Water-hammer. There should be a liberal distribution of relief valves to prevent water-hammer.

The simplest method of preventing shocks of water pipes or what is known as "water-hammer," according to Prof. Thurston, of Cornell University, is to introduce devices compelling the slow opening and closing of valves and cocks. For this purpose, he contends, the time required to close the valve would be proportional to the length of tne pipes. Air chambers, if placed in

the line of the pipe near the valve, will prevent the shock almost entirely, but it is difficult to keep them filled with air. If a safety-valve is placed upon the pipe to resist the pressure it leaves a shock depending upon the strength of the spring.

Head or Pressure. The weight of a cubic foot of water, ($7\frac{1}{2}$ gallons*) the equivalent of a column of water 12 inches square and 12 inches high, would be 62.4 lbs. This divided by 144 (the number of square inches in the base of the column) would give a pressure of .433 lbs., or nearly ½ lb. per square inch of base surface for each foot of vertical depth, which, if the loss by "frictional head" hereafter explained, be say 15 feet, would yield, for a "static head" of 200 feet, an "effective head" or pressure of 186 feet at the hydrant, or say 80 lbs. ($186 \times .433$) to the square inch. The effective head for fire purposes in the absence of steamers, whether reliance is placed upon the "direct pressure" system or a gravity reservoir system, should be at least 40 pounds per square inch *at the base of the nozzle*, and the static hydrant pressure must be enough greater to allow for friction in the pipes and for friction in the hose.

This pressure of 45 lbs. will force a $1\frac{1}{8}$ inch stream for effective work to the top of a four-story building of usual height —say 60 feet—and from 230 to 300 gallons per minute will be discharged. A $1\frac{1}{4}$ inch nozzle under like pressure would discharge 20% more, but a $1\frac{1}{8}$ inch nozzle is usually regarded as the most practical for general use. To force the main body of a $1\frac{1}{8}$ inch stream 80 feet vertically would require a pressure of the main body of 56 pounds per square inch or a head of about 130 feet *at the nozzle*. The extreme drops may go 40% higher, but could not put out any noteworthy fire at that elevation. And we may here remark that the height and distance reached by fire streams as measured at firemen's musters are sometimes wholly misleading as applied to practical work, for in such cases they measure the extreme point touched by the farthest drop.

Among firemen and engine men pressure is commonly stated in pounds per square inch. The following table gives the equivalent in pounds per square inch of pressure stated in feet head or vertical height of an equivalent water column in feet. It will be observed that the popular estimate that two feet of head are

*One cubic foot of water=7.48 U. S. gallons.

equal to one pound of pressure will lead to serious error; for instance, on that basis 80 pounds hydrant pressure would call for only 160 feet head, whereas it would actually need an elevation of 185 feet of water column to produce the same pressure. Eighty pounds, or 185 feet head, *at the hydrant* may be regarded as the least pressure giving strictly good fire service, and with this head it is still imperative that the pipe be large enough so that this pressure will not be drawn down greatly when fire streams are flowing. A few feet less would make the difference between a good fire department and an inefficient one.

The friction in 300 feet length of the best and smoothest hose will absorb about one-half of the available fire pressure at the hydrant.*

TABLE FOR CONVERTING PRESSURE GIVEN IN FEET HEAD OF WATER INTO PRESSURE IN POUNDS PER SQUARE INCH.

Feet Head.	Pounds per Square Inch.
1 Ft.	0.43
5 "	2.17
10 "	4.33
15 "	6.50
20 "	8.66
30 "	12.99
40 "	17.32
50 "	21.65
60 "	25.99
70 "	30.32
80 "	34.65

TABLE FOR CONVERTING PRESSURE GIVEN IN POUNDS PER SQUARE INCH INTO FEET HEAD OF WATER.

Pounds per Square Inch.	Feet Head.
1 Lbs.	2.31
10 "	23.09
20 "	46.18
40 "	92.36
50 "	115.45
60 "	138.54
70 "	161.63
80 "	184.72
100 "	230.90

*This loss may be reduced by Siamesing two lines of hose into one nozzle, which would save a large proportion of the pressure usually wasted in friction between the hydrant and the nozzle.

Test of Water Pressure. The head exhibited by a pressure gauge attached to a hydrant or to a fire pipe within a building may often be very misleading as to the pressure available for projecting a fire stream from a hose nozzle. There are towns where the static pressure, or pressure with the water at rest, may be 90 pounds per square inch, but if two hose streams be put in play the pressure will be pulled down to 15 or 20 pounds per square inch or scarcely sufficient to send water into a second story window. In one such instance the town had a gravity supply from a reservoir about five miles distant, and it was the friction in this long line which made the hydrant pressure practically worthless when sufficient water for one or two good fire streams was added to the domestic consumption. In many towns the result of drawing simultaneously half a dozen fire streams from the public mains is never found out until a disastrous conflagration occurs. Both citizens and underwriters, relying upon the static pressure without taking the trouble to investigate what the flowing pressure will be when a large number of streams are drawn, learn of the inadequacy of the fire department only after millions of dollars have been destroyed.

No general statement can be made as to the amount of the loss of pressure by friction per mile of pipe, although it can be readily computed for any particular case. At the present day there is little excuse for ignorance of these matters, when a practical test by a number of fire streams at once will answer the whole question in so certain and satisfactory a manner. Engineering science is competent to answer questions as to pressure when a diagram showing the length and diameters of the pipes and their condition regarding rust is at hand, but the practical test is more convincing and reliable. The best test, therefore, of effective pressure of hydrants for any city level is to *attach lines of hose and turn on the water;* and this is the test which inspectors of water-works and underwriters fixing rates and hydrant deductions for any section should, in my judgment, rely upon.

Frictional Head. What is known as the "static head," or the head of a body of quiet water at rest, as stated, is diminished by the "frictional head" or loss of pressure from friction in

flowing through the pipes, which increases proportionally to the square of the velocity of the water and is increased greatly, also, by the smallness, roughness or tuberculation of pipes. For a similar reason pipes, where located in undulating ground, causing the collection of sediment, should be "blown off" frequently.

"Dead ends" should be avoided, if possible, by completing the parallelograms and connecting the ends by an additional sub-main or pipe—a comparatively inexpensive precaution in the line of a true economy, since the growth of a city would eventually require such additional pipe. It is not always possible to connect dead ends by cross sections of pipe to complete parallelograms, since the uneven growth of a city may carry one main for blocks beyond parallel mains, and there must of necessity, therefore, be some dead ends in such a system. In the city of Detroit an admirable system is followed, that of placing a cistern at the end of each street where water pipes are laid. This reservoir serves not only as a "blow off" for the main, but enables the engines to do effective service by pumping from the reservoir, which they could not do from a hydrant on such a dead end, as with the latter they would soon "run away" from the water in the main.

Loss of Head per 1000 Feet. There is a material loss of "head" where the water main is not of proper capacity and where the water has to travel great distances. The loss of head for each thousand feet of travel, in a new, straight, clean, water main 14 inches in diameter, is about 7 1/3 feet per thousand feet of length of pipe, the velocity of flow being 5 feet per second, or say a loss of 40 feet head per mile. Pipes are seldom or never laid straight, and they do not long remain new and free of rust, and where the reservoir is, say, two miles distant from the operating hydrant it may safely be assumed that if the domestic draft, plus the fire draft, amounts, at any moment, to 2400 gallons per minute, then even with a nearly new pipe the pressure at the hydrant will be at least a hundred feet less head, or fully 43 pounds less pressure, than at the reservoir.

"*The rule that the loss of head by friction is proportional to the square of the velocity*, applies not only to a simple pipe, but is substantially true for combinations of pipes of different sizes joined either by taper reducers or by sudden contractions, or for pipes containing obstructions and curves. It is also useful to keep in mind that for cases of a pipe system in combination with a discharg-

ing orifice or with a series of discharging orifices, so long as all the discharging orifices lie at substantially the same elevation, the opposite of the above proposition is true and of wide application: viz., *the quantity discharged through a given pipe system and the orifices in connection therewith is very nearly proportional to the square root of the pressure* measured at any convenient point anywhere along the pipe system, providing the pressure be reckoned from the level of the orifices."

Capacity or Relative Discharge of Pipes. There is a popular misapprehension among mechanics in supposing that the carrying capacity of a pipe increases exactly in proportion to its area or to the square of its diameter. Really the carrying capacity increases faster than this, by reason of the lessened influence of skin friction in a larger pipe, or, stated in mathematical language, *the capacity to convey water is proportional to the square root of the fifth power of the diameter.*

For example, the relative capacity of a 5-inch pipe as compared with a 10-inch pipe would be in the proportion that the square root of the fifth power of 5 inches (55.9) is to the square root of the fifth power of 10 inches (316.23.) In other words, the discharge of a 10-inch pipe, instead of being double, would be nearly six times that of a 5-inch pipe.

The following table and those commonly given in the text-books for friction loss in pipes are apt to be misleading for the reason that they state the friction loss per hundred feet *in new, clean pipe.* The actual loss in practice will often be found double the loss as tabulated for new, clean pipe, by reason of the bunches of rust which forms on the interior surface even of the best pipe with nearly all waters. Careful experiments on corroded pipe as compared with clean pipe have shown that a very moderate amount of corrosion will nearly double the frictional loss, and to prepare the table on page 256, the frictional loss as stated in the excellent and convenient table prepared by Mr. Edmund B. Weston, Civil Engineer in charge of the Water Supply of Providence, R. I., has been doubled.

TABLE SHOWING CAPACITY OR DISCHARGE OF PIPES OF DIFFERENT DIAMETERS FOR VARIOUS VELOCITIES OF FLOW AND FRICTIONAL HEAD IN FEET PER 1000 FEET OF LENGTH,

for new, clean, straight pipe.

Diameter of pipe in inches.	Velocity of flow in feet per second.	Loss by frictional head per 1000 feet l'th. In feet head.	In lbs. per sq. inch.	Capacity or discharge. In gallons per min.	In gallons per day (24 hours.)
4	3	10	4.33	113	165,000
	4	17	7.31	150	215,000
6	3	7	3.01	260	375,000
	4	11	4.76	340	485,000
8	3	5.4	2.32	490	700,000
	4	9	3.87	640	915,000
10	3	4	1.73	750	1,075,000
	4	7	30.1	975	1,450,000
12	3	3	1.29	1,050	1,500,000
	5	9	3.87	1,800	2,600,000
14	3	3	1.29	1,500	2,150,000
	5	7.3	3.14	2,400	3,500,000
16	3	2.5	1.07	1,875	2,700,000
	5	6	2.58	3,200	4,600,000
18	3	2	.86	2,400	3,500,000
	5	5.5	2.36	4,100	5,925,000
20	3	1.7	.73	3,000	4,300,000
	6	7	3.01	6,000	8,600,000
24	3	1.3	.56	4,125	5,900,000
	5	4	1.73	7,125	10,240,000
	6	5.5	2.36	8,625	12,340,000
36	3½	1	.43	11,250	16,150,000
	6	3	1.29	19,000	27,200,000
	8	5.6	2.40	27,250	37,500,000

N. B. The number of streams which a pipe would supply can easily be determined by dividing the quantities of above table by 300 or 500, according to the size or number of gallons per minute of the stream, it being remembered that under the gridiron system, or where the pipe is supplied at both ends, double the quantity of water in the above table may be secured.

FRICTION LOSS PER ONE THOUSAND FEET IN LENGTH OF ORDINARY WATER-PIPES after corrosion by 10 to 20 years OF AVERAGE PRACTICAL USE.

GALLONS PER MINUTE DISCHARGED.	DIAMETER OF PIPE IN INCHES.						
	4 in.	6 in.	8 in.	10 in.	12 in.	14 in.	16 in.
	PRESSURE LOST IN POUNDS PER SQUARE INCH.						
250	41.	5.	1.	.37			
500	168.	20.	4.6	1.45	.58		
750		44.	10.8	3.3	1.3		
1000		76.	19.	5.9	2.3	1.1	
1250			29.	10.	3.6	1.7	.8
1500			42.	14.	6.	2.7	1.2
1750				19.	3.	3.3	1.6
2000				25.	10.	4.3	2.2
2250					13.	6.	3.
2500					15.	7.	4.
3000					22.	10.	5.

The number of 500 gallon fire streams supplied can be determined by divid ing the quantities of the first column by 500.

It may be assumed that 3,000 population, at their hour of maximum draft (as at 10 A. M. Monday), will draw for domestic purposes the equivalent of one fire stream.

It is not generally understood how great is the loss of head by reason of roughness in the pipes or of sharp, right angle bends. By the use of curves of moderately long radius, the loss caused by elbows may be made practically insignificant. Pipers do not commonly use them, because they cost a little more.

If the diameter or capacity of the main should be increased the loss of head would be less; a 16-inch main, for example, would show a loss of not much more than half the frictional loss of a 14-inch main, the number of gallons per minute carried being the same in each case.

We have thus far been speaking of variations between the carrying capacity of pipes of different sizes. Another problem is the variation of friction loss with the same pipe when different quantities are drawn through it. Then the friction loss varies as the square of the velocity.

Taking a 6-inch pipe for our unit, this being the smallest that should ever be used for a hydrant main, and comparing pipes on the basis of their carrying capacity, we find:

One 8-inch pipe is equivalent to 2.05 6-inch pipes.
" 10 " " " " " 3.58 " "
" 12 " " " " " 5.65 " "
" 14 " " " " " 8.32 " "
" 16 " " " " " 11.60 " "

If we compare the pipes on the basis of cost complete, as laid in large quantity (with cast iron and lead at the low prices of to-day) the relation will stand as follows:

DIAMETER.	COST PER LINEAL FOOT COMPLETE.*	COST COMPARED WITH 6-INCH.	CARRYING CAPACITY COMPARED TO 6-INCH.
6	$0.52		
8	0.70	1.35	2.05
10	0.90	1.73	3.58
12	1.20	2.30	5.65
14	1.45	2.79	8.32
16	1.65	3.18	11.60

In other words, an 8-inch pipe costs $1\frac{1}{3}$ times as much as a 6-inch pipe and will carry two times as much water; or, again, a 16-inch pipe costs three times as much as a 6-inch and will convey eleven times as much water.

Stand-Pipes. In the absence of a sufficient elevation to secure a gravity head, a "stand-pipe" of the tank kind is used to secure needed pressure and also a supply in case the pumps should break down. A stand-pipe of the tank form, 24 feet in diameter by 100 feet high (and there are some larger ones throughout the country), would hold a quarter of a million gallons of water, which (providing the last drop could be drawn out and give good pressure, and providing all was used for fire and none for domestic supply meanwhile) would supply five hydrant streams of 250 gallons each for $3\frac{1}{3}$ hours. A good ordinary steamer would average 500 gallons per minute, and one-quarter million gallons would supply two steamers about four hours; but while such a supply would be, in many instances, sufficient for extin-

*1902 prices are somewhat higher.

guishing an ordinary fire, especially if the stand-pipe or reservoir could, in an emergency, be fed by reserve pumps—in which case the supply could be regarded as margin enough to cover the interval while starting the reserve pumps and boilers—it must be borne in mind that stand-pipes are seldom of sufficient diameter to afford an ample fire supply. Their capacity to supply a number of hydrant streams is a subject of widespread popular misapprehension. It takes *volume* of water to put out a fire—*pressure* alone will not do it, and it does not follow that a stand-pipe 20 feet in diameter which exhibits say 80 pounds static pressure on a gauge when full, will afford good fire service. Ten feet in depth of a stand-pipe 20 feet in diameter will supply five hose streams only 18 minutes, and a single fire stream will draw off as much water as the *average* domestic consumption of 6,000 people or the maximum consumption for 3,000 people.

It should always be remembered that the water in the lower part of a stand-pipe is practically useless for fire purposes so far as pressure is concerned, and serves only to fill mains for suction by steam engines, if there be any.

In small towns stand-pipes are often supplied by pumping for a few hours during the morning or evening on alternate days, after which the fires are banked or extinguished and the water allowed to draw down under domestic draft. It is unnecessary to suggest that if a fire should happen to break out when the pipe has been drawn down, the boilers cold and the engineer asleep or absent, a conflagration is not likely to be extinguished.

Ice in Stand-pipes. Stand-pipes are liable to rupture in the winter-time by the falling of ice, which forms at low temperatures, and which when the water is drawn down for consumption is liable to fall through perhaps twenty or thirty feet of intervening space. The hydraulic shock of a cake of ice weighing hundreds of pounds and falling through twenty or more feet of space is tremendous, and the wonder is that a greater number of stand-pipes are not ruptured each year in this manner. The pressure on the volume of water when the ice strikes it is more than sufficient to rupture a strong iron pipe.

On March 14, 1900, the steel stand-pipe of the Elgin water works, 30 feet in diameter and 95 feet high, burst at 8 o'clock A. M. About one hundred thousand gallons of water had been

drawn out that morning, and it was found after the pipe had fallen that ice to the extent of several hundred pounds had formed in the upper portion in a thick cake, which when it struck the water below forced out the iron sheets and resulted in an entire collapse of the structure, after which the city had to rely upon the direct pressure of the water pumps.

This is a serious danger, and local underwriters should always have it in mind and investigate the condition of the stand-pipe in winter, to ensure proper precautions against such catastrophies. If the failure of the stand-pipe should happen to occur at a time when the pumps should be disabled the city would be entirely without supply.

Air and Vacuum Valves, Blow-off Valves, Etc. When water is forced into delivery mains more or less air is taken along with it, and where the pipes undulate to conform with the contour of the ground this air accumulates in the summits, and in the course of time interferes seriously with the flow. As a means of relief, air valves should be located at such points. These valves are now combined in the same piece of mechanism with vacuum valves, which are required at the same points for the reason that when the pipes are drained for repairs or other purposes there is a tendency to form vacuums at the summits, which will cause collapse unless relief is given or the pipes and joints are strong enough to stand the pressure. It may be added that hydrants when properly located can be made to perform the offices of both air and vacuum valves.

Caution must be exercised when filling the pipes to see that air valves are opened and the water admitted no faster than the air can escape, as otherwise the compressed air sets up an aggravated form of water hammer causing the water to rush back and forth violently and the weak parts will suffer.

Attention is again called to the desirability of providing blow-off valves at suitable points. Sediment will accumulate at the low points of the pipe system and, after a while, will seriously impede the flow unless removed. By having blow-off valves at these points the proper remedy is provided.

Hydraulic Grade Line. An essential condition which is sometimes overlooked is the necessity of keeping the elevation of the mains below the Hydraulic Grade Line. Often the contour of

the ground is followed without regard to this all important feature. Where this point is not considered, not only is there a tendency towards the formation of air pockets at the summit but the pressure conditions in the pipe are entirely changed. The water in that part of the pipe between the reservoir and the point of elevation above the hydraulic grade line has a velocity due only to the head given by their difference of elevation. Beyond that point if there is a greater difference of elevation to the point of outlet the velocity will be greater and hence the supply from the first part will not be equal to the capacity of the other part, and the water in the latter part will not be under pressure at all but will flow as though in a gutter.

It is sometimes necessary because of the nature of the ground to go above the hydraulic grade line. In this event, the diminution of flow caused by reduction of velocity in the section between the reservoir and the point of elevation above the hydraulic grade line, may be compensated for by making the pipe larger in this section than beyond it.

High and Low Service. In the case of cities having different levels and consequent "high and low service," such as Kansas City, Albany, Brooklyn, Cleveland and others, it is important that the two systems should be connected by means of check and gate valves, which can nearly always be arranged at slight additional cost so as to make the high service available for the lower levels in case of fire. They can be disconnected at any time when the exigency is removed.

The difference in elevation may be so great in a town that while the service in the lower part is entirely satisfactory the pressure in the higher portion is so reduced as to become practically valueless. It is desirable in such cases to provide, by some means, for increasing the pressure at the higher elevation. When this district is small and will not permit of the introduction of a high service system, or even the maintenance of a steam pump, a device which is now in successful operation in the city of New London, Ct., may be introduced with advantage. This consists of a tank, having sufficient elevation to give the requisite pressure, which is supplied by a hydraulic water motor. While it is not the intention to describe this motor in detail it may be stated that it is operated by the water consumed in the

lower part of the town. It is located on a supply main, and receives the power to operate it from the passing water, which, after performing its work, is carried on, with but slightly diminished pressure, to be used in the low service system. By ingenious automatic arrangements the two systems are made communicating as occasion arises. It is claimed for the motor that it possesses advantages of cheapness, of consuming no fuel, of working day and night, and of requiring but little attention. The reduction in pressure above the motor and below it is inconsiderable, the figures in the one to which we refer being found from actual test to be 34.62 lbs. above the motor and 31.46 lbs. below. Its cost was $5000 and it has proven amply sufficient for the needs of a district requiring from 100,000 to 150,000 gallons per day. It may be remarked again that it is claimed the cost of maintenance is very small, that it requires but little care and that the initial cost is practically all that has to be considered.

A full description of this motor will be found in a valuable paper read before the New England Water-Works Association Dec. 14, 1892, by Mr. Walter H. Richards, C. E., Junior Editor of the Association.

Water Mains and Pipe Distribution. That system of pipe distribution is best where the street mains run at right angles to each other throughout the city or town *connecting at every street intersection*—"gridironed", so to speak. This arrangement insures that each pipe will be fed practically at both ends and will double the feeding capacity.

Size. The subsidiary mains passing through the various streets should, in the business or compact portion, be not less, in any case, than 8 inches in diameter, and in the dwelling section not less than 6 inches in diameter. This size should be liberal in the compact mercantile portion, for the reason that existing conditions of low or small buildings may, with the growth of the town, be radically changed by the subsequent erection of more dangerous structures. It should be remembered that faults in the placing of hydrants may, at any time, be remedied, but mistakes in the size of street mains are not easy of correction and, keeping in mind the fact that the cost of excavation, leading of joints and labor is very nearly as great

in the case of small mains as in the case of larger ones, it is poor economy to lay an inadequate pipe in the first instance.* Where the district is a large one, containing large buildings and values, 12-inch mains should be used, at intervals of say a thousand feet, as feeders. The Boston engineers are at present working toward a system of 12-inch mains, about a fourth of a mile apart, crossing by gridiron distribution between these with 8 and 10 inch pipes, in the business section, and 6 and 8 inch pipes in the outlying district.

Boston already has 28% of its service in 12 inch mains and New York 25%.

The feeders or larger mains should supply the "gridiron" from the outside, instead of extending through the centre. Not only will this insure better service, but the arrangement will respond to future demands upon it as the city increases in size —an important consideration.

In a seaport city the water main on the water front should be at least 16 inches, with numerous hydrants.

I quote from one of the many valuable treatises on water supply by Mr. John R. Freeman, of Boston, the well-known and able engineer, as follows:

"*Within a crowded and valuable metropolitan district, a diameter of eight inches is the smallest that can be recommended for the general network or gridiron of intersecting pipes*, having in view the deterioration in water carrying capacity which occurs in time with nearly all waters.

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*Cast-iron water-pipe may be purchased at $19.50 per ton, freight added. Four-inch cast-iron water-pipe weighs 20 pounds to the foot, 6-inch 30 lbs., 8-inch 45 lbs. and 12-inch 80 lbs. The difference in price, therefore, between 6-inch and 8-inch pipe would be, roughly, about 15 cents per foot, and the cost of laying 5 cents more, in all a difference of 20 cents per foot, or $20 per hundred feet. (See page 257.)

The difference in insurance rates in favor of property on the line of 8-inch mains as compared with 6-inch mains, in the Universal Schedule, (see Nos. 155, 156, 190, 192) is 7½% on buildings and 5% on stocks. There would be eight 25-foot buildings, counting both sides of the street, on 100 feet length of pipe. It would be a low estimate of value to assume $50,000 insurance on each lot, or 400,000 in all. If the average insurance rate should be 80 cents per $100 on a 6-inch main, it would be 5%, or 4 cents per $100 (40 cents per $1000) less on an 8-inch main, making *an annual saving to property-owners in insurance premium of* $160 for the extra cost of $20 in a pipe which would last for fifty years and which the property-owners would save eight times over in a single year. Could any civic policy be more stupid or shortsighted from an economic standpoint than the laying of 6-inch pipes in the compact mercantile portions of cities!

There is a greater difference still between 8-inch pipe and 4-inch pipe, the insurance rate being 15% higher on buildings and 10% on stocks on the line of 4-inch mains as compared with 8-inch mains.

For valuable metropolitan districts a pipe so small as eight inches is suitable only when forming part of a general network whose intersections are not far apart, say not more than 300 feet in one direction, by 800 feet in the other. When the cross connections are smaller than eight inches or farther than 800 feet apart, a ten inch pipe may be needed. Along the borders of the gridiron the size should be larger. This reinforcement by cross connections is of the utmost importance, and if absent it may require a 16 inch pipe to afford the same delivery as a gridiron of six-inch pipes.

Within almost any suburban residence district where there are frequent cross connections, also within compactly built cities of medium size and even those of large size and of medium hazard, excellent protection may be afforded by a gridiron of six-inch pipes along each of those streets running in one direction, intersecting, at 500 feet intervals, with pipes eight inches in diameter, in each transverse street. The maximum of economy in pipe will be secured *if the six-inch pipe runs lengthwise of the blocks.*

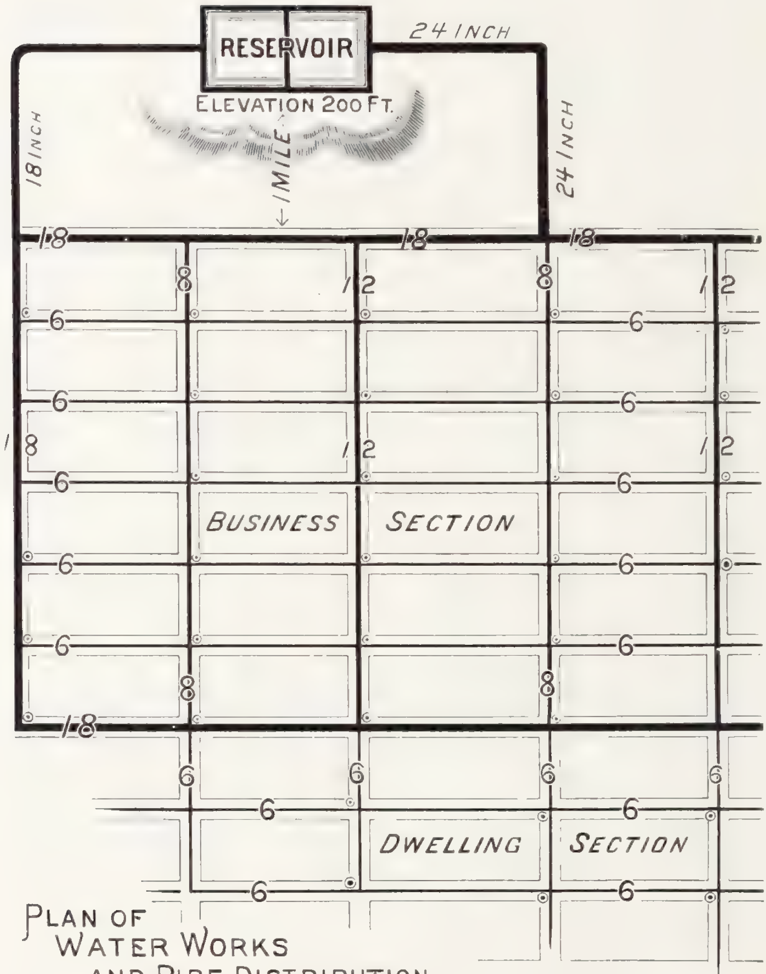
For small cities in which the streets run so that frequent cross connections are possible, very satisfactory protection can be had by a network of pipes none of which exceeds six inches in diameter; but along the margin of the gridiron there should be a few main arteries of larger sizes and the size of a few of the pipes near any large hazardous building, as a valuable factory or warehouse, may need to be increased.

This use of six-inch pipe, however, *presupposes that the six-inch pipe makes a complete circuit about each street block which is to be protected, so that the water will flow in toward the point of heavy draft from nearly all directions.*

A block located in the midst of a network of 6-inch pipes may sometimes be much more efficiently served than one past which runs a single line of 12-inch pipe.

Four inch pipe should never be used for a hydrant main, unless it be to protect scattered, detached dwellings in situations similar to a country village or where the closest economy of first cost must be practiced in order to get any general water works pipe system at all, and in these cases it should be clearly understood that starting with say 75 lbs., a line of four-inch pipe one-half mile long so soon as it becomes old and roughened by rust can only deliver water enough for a single 100 gallon fire stream three-fourths inch in diameter, which is too small to extinguish anything more than a dwelling house fire or to do more than protect the neighbors, while the original fire is left to burn itself out.

In many New England towns the hills and valleys have compelled a growth radiating outward in narrow strips or in ways which forbid any such reinforcement of the flow as we have been considering, and in these cases much larger pipes will, on computation, be found necessary to give an equal delivery at the hydrants."



PLAN OF WATER WORKS AND PIPE DISTRIBUTION

Where a city is unwilling to pay for 8-inch mains they should be supplied, at least in part, to carry water from the outside feeders, the 6-inch being used only for lengthwise of the blocks, as shown in the foregoing diagram.

It will be observed that in the gridiron form of distribution shown in the accompanying diagram, every pipe is supplied at both ends and, in case of fire and a draft upon any hydrant, water would run to it from all directions.

Concentration of water for fire at a given point is of the utmost importance, and under the gridiron system this can be secured no matter where that point may be.

It may safely be assumed that while hose lines 500 feet in length can be used with steamers to force the water, it is preferable to have short hose lines, not exceeding, in any case, 300 feet in length. An examination of the preceding diagram will show that with the gridiron system and a "2-way" hydrant at each corner, and street blocks 500 by 200, it would be possible to supply, in case of a fire in the middle of any block, 12 streams, each with less than 350 feet of hose, and a still larger number with 600 feet of hose. Boston can place 52 steamers within 500 feet of a fire and supply them with water.

Siamesing Hose. The loss by friction through greater lengths of hose, as already stated, may be largely saved by connecting the two lines of hose, through a Siamese coupling, into a single line at a point 50 to 100 feet back from the nozzle. Strange as it may seem, it has been demonstrated that there is less friction and a greater supply of water can be secured in this way than by the use of two steamers, one pumping into the other. In this way, a Siamese placed 50 feet back from the nozzle so lessens the loss by friction that with the same steamer pressure a jet will be thrown with exactly the same force through a thousand feet of hose as if the steamer were only 287 feet from the nozzle on a single line of hose. So important a fact should be understood by Fire Departments.

The reason for the difference in results is obvious. Where the water is carried through two lines of hose instead of being forced through one the velocity will be only half as great, and the loss of pressure only one-fourth as much, as where a single line of hose is used; and it is unfortunate that fire departments so frequently overlook the use of a Siamese coupling to connect two lines of hose from a single steamer, especially where the steamer has to be distant from the fire. Two steamers may be frequently seen endeavoring to do with great difficulty what a single steamer with a double line of hose could easily accomplish.

Cast-iron pipe, well tarred is preferable for fire protection to wrought iron, which is sure to rust, or to steel, which will

probably rust. The tar should be applied by the best hot process.

It is important to have smooth throatage. The mere roughening of the inside of a pipe will double the friction loss even where there is no noteworthy deposit of rust bunches or tubercles. One great objection to cement-lined pipe is the thinness of the iron (for cast-iron pipe the iron shell is commonly eleven times as thick as the wrought iron shell used in cemented pipe) in addition to the danger of rusting which, as stated, may be regarded as a certain expectation in the case of wrought iron.

Cement-lined wrought iron pipe, as already stated, is not only certain to become leaky after fifteen or twenty years of use, whereas cast-iron will last for fifty years or more, but it is liable to be destroyed by lightning—a casualty which has happened in Arlington, Woburn, Lynn, Fitchburg and Winchester, Mass., and other places. The cities of Fitchburg, Worcester, Manchester, Spencer, Somerville, Malden and others, have found it necessary to take up the cement-lined pipe and replace with cast-iron. In Rome, N. Y., several years ago, the bursting of a cement-lined pipe during a fire led to a property loss of upwards of $200,000. The objection is to the thinness of the iron, not to the cement lining, which is in itself an advantage. It would improve cast-iron pipe, by saving frictional head, but the extra expense makes its use prohibitory with cast-iron.

The size of mains and pipes should be carefully gauged by competent experts to insure that too much head is not lost by friction, taking into account the supply needed for domestic (household and manufacturing) purposes and fire extinguishing purposes.

Supply. While the amount needed for fire service, *per annum*, is not large, the amount required for a fire will often exceed, for a few hours, that for all other purposes. Twenty hose streams, for example, would require, for each, estimating only 150 gallons per minute, 3,000 gallons per minute, (estimating 250 gallons, would require 5,000 gallons per minute) while the domestic supply for a town of 25,000 population, estimating 75 gallons maximum per capita (a large estimate) per diem, would not exceed 2,700 gallons per minute.

A single good $1\frac{1}{8}$ *inch* × 45 *pounds* × 250 *gallons fire stream takes as much water as would be needed on the average for the ordinary domestic supply of a population of* 6,000 *at* 60 *gallons per day to each person.*

A sufficient fire supply should be provided in addition to the maximum domestic consumption, and double the average draught (or whatever ratio of increase the actual record, if there be a record, may show of the district under consideration) should always be kept in view as the *basis over and above* which the fire supply is to be secured. (John R. Freeman.)

The average domestic consumption for household and manufacturing purposes, per capita, is safely estimated in small cities with little manufacturing at 50 gallons per diem, but at certain hours of the day and on certain days of the week, particularly on Monday, a larger supply is needed, and a common experience is that, at times, the maximum draft will be double the average draft. An average of 110 gallons per capita daily would probably be sufficient for both domestic and fire service. In manufacturing cities a much greater amount is often used. The daily consumption in Boston is over 100 gallons per inhabitant per day. The same is true, on the other hand, of Nashua, N. H. The use of water per capita is steadily increasing. Making allowance in planning new water-works for a growth of a prosperous city or town of 40 per cent. in a decade, it would probably be found economical to gauge the reservoir and supply-mains accordingly, unless an additional reservoir can be constructed afterwards at pro rata expense, which is not likely. To supply a city of 25,000 population, using 365 cubic feet of water per minute for domestic service and, in the emergency of a conflagration, possibly 400 feet more per minute for fire service, would require a 24-inch supply main from the reservoir. Two of these, as already stated, would be better, and insure against breakage. To insure protection, the reservoir should always (even at 4 o'clock Monday morning) hold a reserve for fire of at least two million gallons for any closely built city up to 75,000 inhabitants, and more if the city is much larger.

The following figures are based on estimates of Mr. J. T. Fanning, in his "Treatise on Hydraulic and Water Supply Engineering"—a work well worthy of the study of underwriters.

With a static head of 150 feet and pipes 1,000 feet long, a

6	in.	pipe	would supply	40	cu. ft.	per min.	or 300	gallons.
8	"	"	"	80	"	"	600	"
10	"	"	"	120	"	"	900	"
12	"	"	"	220	"	"	1,650	"
18	"	"	"	480	"	"	3,600	"

All of these figures as to frictional head and discharge, it should always be remembered, are for *new, clean pipe;* if the pipe is old and rusted the loss of frictional head may be doubled.

If the subsidiary pipe relied upon is six inches in diameter and supplied at both ends, the fire supply at each end would be 40 cubic feet, or 300 gallons, per minute, or a total for both ends of 80 cubic feet, or 600 gallons, per minute, with the water flowing at a velocity of $3\frac{1}{2}$ feet per second and a loss of frictional head of 9 feet, or 4 lbs., per thousand feet of length. In case the water is to be taken from one end of the pipe only, it would be better to have the pipe 8 inches in diameter. This would secure about the same discharge, 640 gallons per minute, at the same velocity, and with no greater loss of frictional head, viz., 9 feet, or 4 lbs., per square inch.

Fire Boats. Where a city has a water front and Fire-Boats their powerful pumps may be made available for protecting the compact portion at small expense by running 8-inch pipes (10-inch would be better still) with hydrant connections from the water front to the mercantile centre, thus bringing into the heart of conflagration districts a pressure exceeding that of many steam engines and capable of forcing water to the very tops of high, modern fireproof structures—which, by the way, ought always to be provided with private standpipes and Siamese connections at the street, for the use of Fire Departments, even where fire-boats are not available, so as to save the loss of time of carrying hose for the upper stories, especially if the elevator should happen not to be running, as at night. Where pipes with connections at the water front for the use of fire-boats are thus extended into the city an intelligent system of rating should allow 5% deduction in rate to all buildings on the line of the pipes or within 500 feet of hydrant connections, see items Nos. 186 and 221 of the Universal Mercantile Schedule.

Where the water of the harbor is salt, it may be well to flush the main after a fire by attaching an engine at the land end and blowing fresh hydrant water through the pipe, although with a well tarred cast-iron pipe this would probably be an unnecessary precaution.

Milwaukee is provided with two fire-boats, and has nearly six miles of fire-boat pipe lines, which vary in length from 800

to 3,500 feet. These lines are tapped at each corner as well as in the middle of the block by large hydrants. Six-inch pipe was found to be too small, and at present all fire-boat pipe lines being laid are 8 and 10 inch—10 inches for a half or two-thirds of the distance, the remainder being 8-inch. Chief Foley states that in a test with a 3,250 ft. line, using a $2\frac{1}{2}$ inch nozzle, the jet of solid water was 120 feet, or the height of an ordinary elevator. In another test, with a 2,250 ft. line two leads of 50 feet each, $3\frac{1}{2}$ inch hose and 2 inch nozzle, solid water was thrown from both to a height of 180 feet; after which, Siamesing both streams and using a 3-inch nozzle, water in a solid stream was thrown 198 feet. The connections at the water front are for six $3\frac{1}{2}$ inch leads for all the long lines. In warm weather the lines are kept full to save time in starting, but emptied with freezing weather.

The experience of Milwaukee, proves the great advantage of having 10-inch pipe, and nothing less than 8-inch, although the 6-inch does admirable work. The difference in the cost as compared with 8 and 10-inch is so slight in view of the great superiority of the larger pipe as to make the false economy of small pipe extremely shortsighted.

Detroit has a most extensive system, its pipe lines having been laid in nine streets and varying in length from 700 to 4,000 feet. The long line of 4,000 feet has delivered from one hydrant four $1\frac{3}{4}$ and one 2-inch magnificent fire streams. The superiority of the streams delivered from the pipe lines as compared with those of the engine is readily apparent to the most casual observer. The water comes with greater force, in a more solid body, and does the most effective work.

The Detroit lines are provided with a cut-off valve opposite each hydrant, so that in the event of walls falling on the hydrant the water may be shut off without shutting off the entire main, and the pipes are inclined toward the river, enabling the fire-boat to fill them when necessary, while in cold weather they are immediately emptied by means of a valve at the foot of the street. In the warmer months they are allowed to remain filled.

I quote from a valuable paper written by Mr. James E. Tryon, Secretary of the Fire Commission, Detroit, on the subject

"What a Water Supply Engineer Can Do in the Fire Department," and read by him at the Convention of the New England Water-Works Association, in June, 1894:

"The Detroit pipe lines, laid for the purpose of making the fire-boat available for fires at least one half mile distant from the river, were planned by and laid under the supervision of the compiler of this paper, and a brief description of them may not be out of place. These lines consist of three long lines, two thousand feet each, and three short lines of one thousand feet each, or nine thousand feet in all. For these lines the 8-inch steel pipe, such as the Standard Oil Company uses for piping crude oil from the oil fields to tide water, was selected. The pipe had been subjected to a test of one thousand pounds hydraulic pressure. Connection at the river is made with a three or a five way Siamese with three and one-half inch openings, with a clack valve over each, to enable the boat to start its pumps as soon as the first connection is made. Hydrants having two 3-inch and one 4 inch openings are set at intervals along the line with a manhole opposite each. At the end of the pipe is an air valve loaded to remain open until the water comes, and a relief valve set at 250 pounds, which will open when the pipe is filled and the recoil renders it necessary for something to give way.

We have worked through 1,000 feet of 3-inch hose stretched from a hydrant 2,000 feet from the river, with a pressure of 165 pounds at the hydrant. These results were obtained with a pressure of 176 pounds at the boat. The friction loss in a line 2,000 feet long working through two lines, 100 feet each, of 3-inch hose is as follows:

TWO 1¾-INCH STREAMS.

Pressure at Boat.	Pressure at Hydrant.	Loss per Foot.
120	80	.0002
140	90	.0025
160	105	.0275
180	120	.0300

These lines were fully completed during the summer of 1893, and were filled repeatedly during the past winter. We have had but two incidents to mar the successful working of this branch, one being the failure of the air valve to work, owing to the insufficient load, which made it impossible to fill the pipe, and the other was due to the failure of a relief valve to work, having been set at four hundred pounds. The damage in this case was the blowing off of the Siamese. The pipes are laid as nearly on a level as possible, the lift being about 8½ feet in a thousand. The grade is toward the river, and to prevent the freezing of dead water the pipes are emptied after each filling. When the boat responds to an alarm of fire, connection is made with the most available pipe line and the pumps started just as a land engine fills its line of hose. When the pipe is filled the pumps are stopped to await orders. A single wire laid in a pipe in the same trench with the pipe line is run into the engine room, and a signal code is used, by means of a push button, which can be operated at any hydrant on the line. The boat is signalled by the use of the following code:

1 Bell—Start pumps
1 " —Stop pumps.
3 " —Twenty pounds less pressure.
4 " —Twenty pounds more pressure.
6 " —Pick up.

In this way the pipe line enables the boat to play its part in the work of extinguishing the fires that may occur in the City of Detroit."

It would be possible in such cities as Chicago and New York to make use of their powerful fire-boats not merely for supplying water but for furnishing pressure and throwing so many powerful streams as to be equal to twenty or thirty steamers. It seems strange that such precautions are not taken. It is due to Ex-Chiefs Swenie and Bonner that I should say here that they were not to blame for so serious an omission. It is estimated that in the territory lying between Chambers Street and Fourteenth Street, New York City, the aggregate value of merchandise and buildings exceeds five hundred millions of dollars. The entire loss-paying ability (i. e., capital and net surplus) of all the Companies doing business in the State, domestic and foreign, does not exceed one-fifth of this sum. It is safe to say that the vacuum in community wealth resulting from the destruction of even one-fifth of this territory would be likely to result in commercial disaster which would be felt from the Atlantic to the Pacific. The simple laying of mains with hydrant outlets, for the fire-boats which are already provided, would go far to prevent the possibility of such a disaster.

On March 12, 1888, in consequence of the blizzard, engines would have been powerless to get to a fire. Not so with the hydrants of the fire-boat pipe lines, however; they could have supplied the needed pressure, and it would have only been necessary to attach hose to the hydrants. Such simple precautions should not be neglected in any of the great cities with a water front.

Water Supply at Harbor Level. At very many places, especially seaboard towns, not having fire-boats with pipe-lines, it might be well to use the neighboring water at its natural level, by means of pipes, or systems of pipes, having both ends immersed to secure a constant circulation, the fire engines connecting their suctions therewith through manholes. Cases in point are the tidal drains at Charleston and the canal and basins system at New Orleans, and at both places much use could be made of

the level flow if pipes of proper size were laid and kept fairly clean, as they could be. Much of New York below Canal Street could be protected by the use of a level system such as suggested. At Boston and Norfolk, also, probably it could be made of great service.

Stop-Valves or Gates. Safety cut-off gates should be provided at each corner and on each hydrant branch of the mains, for cutting out any broken pipes, which would otherwise waste the water and diminish the head. By means of these the water may be cut off on each side of a break and a supply secured for a fire in the district or block from neighboring sub-mains, of which there would probably be at least two available on a "grid-iron" system. Inasmuch as accidents are liable to happen to pipes, hydrants or gates from opening streets, etc., such provisions are very important. The breaking of a 3-inch or 4-inch service pipe entering a building will often interfere seriously with the supply. In consequence of the fall of a building, a hydrant, in full play, may be covered with the debris and make it necessary to cut off the section of pipe to which it is attached. The breakage of a 6-inch main and discharge of its contents into the open air would pull down the pressure twenty to thirty pounds and waste enough water to supply a dozen streams. The "stop-valves" or "gates" should be located by some system at a uniform distance from the curb to insure finding them readily in case of necessity, especially when streets are covered with snow. If they are not in the centre of the streets they should be uniformly upon the same geographical side, as upon the northerly and westerly side, and at some fixed distance from the centre of the street and, at the same time, exactly on the side line of the cross street. The location of them can also be indicated by a sign on the nearest building or fence showing the direction and number of feet from the curb line.

Careless workmen frequently break gates while making repairs, and neglect to report the fact, with the result that when the broken gate is left closed the result is felt at a fire. In Detroit it was found that out of 2,600 gates 400 were broken and closed. A systematic inspection of the gates should be made by an employee of the department at stated intervals, and a record kept of his report.

The effect of a broken gate neglected and closed is to make a

dead end of the pipe on which it occurs—a fatal fact which may not be discovered until a fire occurs; hence the necessity of regular and recorded inspections.

Number of Fire Streams Based Upon Population. Hydraulic experts differ somewhat as to this point from each other and, especially in the case of smaller towns, from Underwriters. Mr. Freeman presents "as a rough, general guide" the following table:

Total population of community protected:	No. of 250 gallon streams which should be avail able simultaneously *in addition to maximum domestic draft:*
1,000	2 to 3
5,000	4 " 8
10,000	6 " 12
20,000	8 " 15
40,000	12 " 18
60,000	15 " 22
100,000	20 " 30
200,000	30 " 50

Ten streams may be recommended for a compact group of large, valuable buildings *irrespective of a small population.*

As a general statement the pipes should be large enough and the hydrants numerous enough so that at least two-thirds of the above number of streams could be concentrated upon any one square in the compact, valuable part of the city or upon any one extremely large building or special hazard.

Mr. J. Herbert Shedd presents a formula showing the number of streams needed, from which the following values are taken:

Population.	No. of 200 gallon streams.
5,000	5
10,000	7
20,000	10
40,000	14
60,000	17
100,000	22
180,000	30

From a fire-extinguishing standpoint, it should be borne in mind always that in gauging the size of pipes and mains and determining the location of hydrants no general rule based upon population would be a safe or a wise one. It might be as necessary for a village of 3,000 inhabitants, by reason of the grouping

of manufacturing or special hazards or exceptionally high or large area mercantile structures, to have ten 250-gallon streams as in the case of a town of 40,000; indeed, in the case of the smaller town it might be more necessary than in the case of the larger.

Pipes below Frost Line. In New England the rule is that the axis of water pipes should be five feet below the surface, especially in gravelly or stony ground.

The importance of laying pipes below the frost line ought not to need emphasis. In some sections of the Northwest they may be frozen seven feet below the surface.

Where a pipe line is laid in a street which has not been graded it should be borne in mind that the subsequent grading of the street may lower the surface to within a dangerous distance from the pipe. As much as two feet of the cover may under circumstances be taken off.

Electrolysis. A serious menace to the pipe system of the country has been discovered in fugitive currents of electricity which escape from trolley and other wires unprovided with proper returns in the shape of good copper wire. In numerous instances pipes have been ruined by these currents of electricity, and greater vigilance must be exercised to prevent widespread disaster.

Hydrants. Only "2-way" hydrants should be used in the business or mercantile section. They should be "staggered" through a territory on alternate sides of the street, so that at least half of them would be safe from a line of fire, and they should be so arranged as to be protected from freezing. The importance of protecting hydrants from freezing ought not to require argument. There is no excuse for frozen hydrants, as there are many patterns which with proper care will not freeze. As I write, the entire business portion of a New York town has been destroyed because its steam fire department was helpless by reason of the intense cold. It may safely be stated that the property destroyed in a single winter month of any one year, as a consequence of frozen hydrants, would more than pay for protecting all the hydrants in the country permanently against the dangers of frost. They should have drains to the sewer to carry off the water after being used, and be protected by boxing,

etc. There is no excuse for the almost universal neglect of simple precautions, upon the observance of which the safety of an entire city may depend. Where these precautions are not systematically taken, not more than half the credit for the fire department in rates should be allowed under the Universal Schedule.

The location of hydrants is an important matter. As a rule, they should be on the corners of streets, for obvious reasons, chiefly because they would, at such locations, be most quickly discovered. It may happen, however, that the location of a hydrant in too close proximity to a dangerous risk of large area or height might be injudicious.

Two "2-way" hydrants are preferably to one "4-way" hydrant, on account of frost and the probability that at least one may not be frozen.

Hydrants should be liberally distributed; it is a mistaken economy to have them too far apart, not alone because of the loss of frictional head in great lengths of hose—a serious matter—but by reason of the simple fact that 6-inch cast-iron pipe can be laid for about the cost of the best $2\frac{1}{2}$ inch hose, with the further important difference, as Mr. Freeman suggests, that the life of the hose will not average more than five to ten years, while the pipe will last half a century. The greater length of hose, moreover, is liable to accident at a critical moment.* In the compact mercantile portion hydrants should not be over 250 feet apart.

The post hydrant, having a $5\frac{1}{4}$ inch or 6-inch riser, with rounded corners, is preferable to the flush hydrant, even where the latter has an extra "4-way" outlet, especially in Northern States, where a covering of snow might interfere with finding the hydrant; on very narrow streets, however, the flush hydrant may be better. In Boston, the location of flush hydrants is

*Mr. Freeman says: "More than half the static hydrant pressure is wasted in overcoming the friction through too long a line of hose or too small a street main. Good jacketed fire hose now costs about 75 cents per foot. A 6-inch, tar-coated, heavy cast-iron main can be laid for about 75 cents per foot, cost of pipe, trench, lead and laying all included. A city can buy a good two-way hydrant for less than the price of 50 feet of good fire department hose and its water department can buy and put down 100 feet of the best six inch cast-iron water pipe for just about the same price that its fire department pays for an equal length of hose."

indicated by signs on buildings opposite the hydrants, stating the number of feet and the direction from the curb line. An eight-inch feed pipe, a six-inch riser and round corners leading to the hose nipple will be true economy even for a 2-way hydrant, especially where the pressure exceeds 75 lbs. per square inch.

False economy is practised in selecting hydrants having the main gate and riser only four inches in diameter; the 4-inch stand-pipe sacrifices too much valuable water pressure to be longer tolerated in new work and should be discontinued together with the 4-inch water main. For ordinary purposes of fire protection a standard hydrant should have a main gate and riser at least five inches in diameter and be provided with two outlets for hose. It is not necessary to have independent hose gates on these outlets, as if one does not happen to be used it may be covered by a cap or closed by a portable hose gate carried on the hose wagon and already connected into the rear end of the hose line, while a second gate is at hand for attachment of the spare nozzle during the time the hose is being run and before the hydrant gate is open. The standard hydrant should have a bell for connecting with the water pipe at least six inches in diameter.

It would seem unnecessary to suggest that when hydrants are being located they should be attached to the larger of two available mains, were it not for the fact that in so many instances as almost to amount to a rule they are placed upon the smaller of two mains, simply because the connection costs less money for the pipe laying contractor. This fault is so common, and the consequences are so serious, that it should be the rule of any city that no hydrant connection should be covered up until the Fire Department has had an opportunity to examine and pronounce it satisfactory. With the use of modern appliances in the shape of tapping machines it is possible to connect with the large mains without shutting off water.

The Fire Department should have charge of the location of hydrants, as in Detroit, the only city, I believe, where this is the case. The firemen can be trusted, in all cases, to put a hydrant on the largest available main.

A notable instance of indifference on the part of a Water Works Company to avail itself of large mains was discovered in Detroit. I quote from Chief Tryon's report of it:

"In April, 1893, a fire occurred in one of the buildings forming a part of the plant of a large brewing company in Detroit. The fire was quite ugly at the outset and the officer in command promptly sent in a third alarm. Three engineers whose engines were located on Jefferson avenue in which was a 42-inch supply main, with a 6-inch distributing main alongside, complained of poor water and proved it by recording a vacuum pressure on their combination gauges. It did not need the gauge, however, to tell the story, as by standing next the hydrant I could hear the suction. I could only think of a broken gate somewhere on the line, but when the Engineer of the Water Works set about investigating, he developed one of the most serious minor defects in our system. It appears to have been the practice heretofore to lay large and small supply mains through districts they were intended to supply *without connecting them to cross lines.* In this case the *engines actually pumped dry a section covering many acres, and the investigation revealed that while the 42-inch and 6-inch mains were laid parallel they were only connected at points 5,100 feet (nearly a mile) apart, and that the district north was supplied entirely from this 6-inch main and all hydrants were connected with it!*"

Another fire in March, 1894, developed the fact that while an 8-inch main had been provided, *the hydrant was on a 4-inch main*, from which an engine could not get sufficient water. I quote from Mr. Tryon's report:

"The supply in this case was an 8-inch main, *the hydrants being on 4-inch mains*, one just north and the other just south of the 8-inch. An investigation showed that the following conditions existed: The gate on the north side of Michigan avenue was closed so that the engine *was pumping out of a 4-inch pipe*, having a feed from but one way and *that from a 3-inch pipe.* This was in a section which has been built up a great many years and the pipeage is as old as the locality. Even had not the gate been closed the pipeage was not sufficient to feed the large engines as was shown in the case of No. 8. With one 1¼-inch stream they were all right, but when they came to add a 1⅜-inch stream they were lost."

It may be assumed as a fact that underwriters have no more important business on hand than that of making proper rates for such unprotected territory, for it may safely be said that millions of dollars worth of property located on inadequate street mains is insured below cost under suppositions of adequate mains which, while provided, at great expense, in the street, are absolutely useless for fire purposes owing to the fact that the hydrants are on small pipes.

Hydrants should be painted a bright red, so that the Fire Department can find them easily. Street sprinklers, sewer diggers and other inexperienced persons ought not to be permitted to use them, as they are liable to get out of order.

Two and one-half inch openings should be avoided; 4-inch

should be the rule, especially where 3-inch hose can be handled by the Department,

Hydrants should be regularly flushed, to secure reliability of action and remove the sediment which accumulates in the short arm leading to each post.

Hose. The best quality of jacketed fire-hose, rubber lined and perfectly smooth should be used, of $2\frac{1}{2}$ inches internal diameter. Attempts have been made to use 3-inch hose and abandoned, in some cases, because it has been thought unwieldy. The 3-inch hose, however, is necessary in compact mercantile districts. Chief Croker of New York has 39 companies equipped with 3-inch hose and expects to equip more.

A modern steam engine, using 3-inch hose, with capacity of 1,200 gallons per minute, can throw one $1\frac{1}{2}$ inch and one $1\frac{1}{4}$ inch stream, or, with two short lines of hose, two $1\frac{1}{2}$ inch streams can be thrown. Such streams as these do effectual work. As Mr. Tryon laconically expresses it, they are "solid streams, that do not break until they reach the fire, and leave a black mark where they strike."

Uniform Size and Thread. It is remarkable and inexcusable that a uniform size and pitch of thread for couplings have not been established for the entire country so that the apparatus of neighboring towns can be availed of in case of conflagrations.

The dimensions recommended by the National Association of Fire engineers at the 1891 meeting are as follows:

Couplings for $2\frac{1}{2}$ inch hose, $7\frac{1}{2}$ threads to the inch, 3 1-16 inch diameter to top of threads on male coupling.

Couplings for $2\frac{5}{8}$ inch hose, 8 threads to the inch, 3 5-16 inches diameter to top of threads on male coupling.

Couplings for $2\frac{3}{4}$ inch hose, 8 threads to the inch, $3\frac{1}{2}$ inches diameter to top of threads on male coupling.

Couplings for 3-inch hose, 8 threads to the inch, $3\frac{5}{8}$ inches diameter to the top of threads on male coupling.

Couplings for $3\frac{1}{2}$ inch hose, 8 threads to the inch, 4 1-16 inches diameter to top of threads on male coupling.

Couplings for 4-inch hose, 8 threads to the inch, $4\frac{5}{8}$ inches diameter to top of threads on male coupling.

Couplings for $4\frac{1}{2}$ inch hose, 8 threads to the inch, $5\frac{3}{4}$ inches diameter to top of threads on male coupling.

Couplings for 5-inch hose, 8 threads to the inch, $6\frac{1}{8}$ inches diameter to top of threads on male coupling.

Couplings for 6-inch hose, 8 threads to the inch, 7 1-16 inches diameter to top of threads on male coupling.

Mr. Charles A. Landy, in an instructive paper on this subject recommends, with much reason, it seems to me, the adoption of a uniform thread of $7\frac{1}{2}$ threads to the inch for this reason that the $7\frac{1}{2}$ swivel part of couplings will connect with 7 or 8 thread male couplings and, therefore, meet the majority of existing conditions throughout the country.

The same dimensions should be followed by all mills and manufactories relying upon the co-operation of the nearest city or village department in case of fire. It has frequently happened that such auxiliary aid has been valueless, simply because hose and hydrant threads would not fit those of the department, and reducing or expanding couplings had not been provided to remedy the fault.

This subject of uniform thread and coupling is deserving of a special convention of Engineers for its consideration.

At present numerous cities capable of helping each other are powerless to do so.

As early as 1830, Mr. Braidwood, the celebrated English Fire Engineer, suggested that if uniformity in the structure and design of apparatus could extend to the most minute particulars, "a screw or nut of any one engine would fit every other engine in the kingdom."

Steam Fire Engines. This suggestion of Mr. Braidwood as to uniformity in the size of nuts and parts of machinery is a far-reaching one. At present the situation in this country is grave from the standpoint that steam fire engines, probably without exception, are of such delicate construction that they resemble the machinery of a watch. They are liable to breakage, and when broken it is discovered that they must be sent to a distance, to the shop of the manufacturer, to be repaired, involving the risk of conflagration during their absence and outlay for expense because of the exclusive privilege of repairing. Money is needlessly spent on nickel-plate, brass finish and gewgaws, which should be either saved altogether or expended in improving the working parts, all of which should be of such simple, strong construction as to be easily repaired by a mechanic of average ability, to be found in any town. A blacksmith, for example, should be capable of repairing almost any portion of a steam fire engine, and the nuts and bolts should be interchangeable.

It is safe to say that the reliability of steam fire departments is materially impaired by reason of the faults mentioned, and that the steam fire engine of the future, when underwriters decide to act upon their present convictions, will be one whose working parts are not only so strong as to reduce the breakage risk to the minimum but of such simple character that they can be easily and quickly repaired, in most cases by the substitution of duplicate parts carried by the engineer himself.

Hose Nozzle. 1⅛ inch is regarded as better for many reasons than 1¼, although the latter, especially with Siamese connection, is decidedly preferable where it can be used. The chances of extinguishing a fire are directly proportional to the amount of water thrown. Small streams are less efficient, as a large portion of the stream is evaporated before it reaches the point of conflagration, and unless water is brought to the burning surface it has little effect.

I quote from Mr. Freeman.

"The efficiency of a water works or fire department is measured by its ability to control a bad fire before it becomes a sweeping conflagration, and the design should be based upon streams suitable for this purpose.

Experience shows that large streams are much more effective on a fierce fire than small streams. A small stream may be so completely evaporated into steam as it passes through the flames as to never reach the seat of the fire.

A fire cannot be extinguished by *wetting the flames.*

In every fire which makes a flame, there are two processes taking place—the *first process is the roasting out of gas;* the *second is the burning of this gas.*

Water extinguishes mainly by *chilling the ignited surface* so no more gas is given off—the flames then die.

With a large stream, even though half the water be evaporated as it passes through the flames, there may be enough left to *quench the glowing coals which form the heart of the fire.*

Thus we see the reason for the opinion to which many practical firemen have been led by experience that given, say, 1,200 gallons of water per minute under good pressure—this will do more good on a fierce fire if concentrated into four 1¼ in. streams of 300 gallons each, than if used in six 1 in. streams of 200 gallons each, or ten ¾ in. streams of 120 gallons each.

A 1¼ in. stream is used in many departments and is often better than the 1⅛ inch, if water is plenty and length of hose short. If hose is long, the friction due to pushing so much water through so small a pipe leaves the nozzle pressure so small that the stream is too feeble.

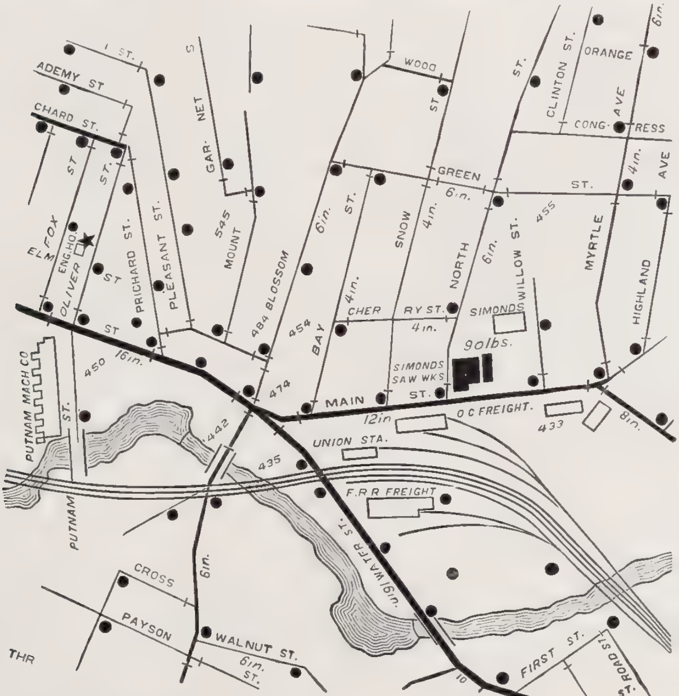
Thus from the hydraulic principles involved, we find that with hydrant pressures of 80 to 100 lbs., and lengths of hose from 200 to 400 feet, the 1⅛ in. nozzle is the size best adapted for all-around use with 2½ in. hose.

On the other hand, from the teachings of practice and without any discussion of scientific principles, the 1⅛ in. smooth nozzle has come to be the size most common in the best American fire departments."

In the great Boston fire of 1889, it was safely estimated that enough water was thrown to flood the district of 3½ acres involved 12½ feet deep.

A smooth nozzle and rigid pipe are necessary.

Pipe Diagram. An accurate diagram of the pipe system of the city, showing the size and location of mains and hydrants, with stop-valves and gates, should be in the hands of the Fire Department Chief and the Local Board of Fire Underwriters. In most cities and towns throughout the country, to-day, the only diagram of this kind is in the office of the Water Works or, worse still, in the possession of some private individual, whose selfish pride in the exclusive possession of it is such that



PIPE DIAGRAM of SECTION of FITCHBURG MASS.

the important secret is likely to die with him. The writer has found this latter condition to exist, strange as it may seem, in more towns than one. In an important western city, not even the water works company knew the location or sizes of the street mains, and the individual who alone possessed the information was trading upon it in order to enjoy a life monopoly in making repairs.

In making a pipe diagram of the city, it is well to omit the street lines and show only the pipe lines with the names of the streets. This system insures greater clearness, and is the method pursued by Mr. Freeman. The foregoing diagram shows a section of his pipe diagram of the city of Fitchburg, Mass. The heavier arteries or feeders are shown by corresponding heavier lines. The size of the pipe in inches is clearly legible, and where there is both high and low service both systems may be shown by tracing the pipes of the low service in red ink and of the high service in blue ink. The heights of various levels above mean sea level are shown in figures, 474, 454, &c.

Expert Management. The system of a city should be under expert management and the person in charge should understand hydraulic engineering; something more than a knowledge of mechanics is necessary.

Municipal and Private Ownership of Water-Works. Every municipality should own and control its water-works system *ab initio*, in order that it may, from the very outset, determine the size and quality of the street mains, and in order also that it may secure efficiency at the lowest possible cost. Theoretically, an honest private corporation can supply a municipality with water under a contract which contemplates the purchase by the municipality, at some later date, on an agreed price, but in practice it is a mistake for a town to enter into contracts of this character. The credit of the town is usually the basis on which the corporation floats its bonds and stock. Even though the credit be not traded upon as a guarantee, the stock of the company is sold on the supposition that the town will have to take the water for a term of years and buy the plant in the end. It might, therefore, as well float its bonds and trade upon its own credit from the start. The temptation to put in cheap pipe and to neglect necessary repairs, especially as the period approaches

for selling the plant to the city, is too great, in most instances, to insure the city from a serious loss and the purchase of a worn-out system. I, therefore, advise municipal ownership of water works in all cases.

Responsibility of Private Corporations for Failure to Supply Water for Extinguishing Fires. It is to-day well settled by numerous court decisions, with but one exception—that of Paducah Lumber Company vs. Paducah Water Supply Company (Ky.), 12 S. W. Rep. 554—that private corporations are not responsible to individual citizens for failure to supply water for fire purposes; even in cases where their contract with the city or municipality makes it their duty to furnish water under proper pressure for fire protection; the courts holding that there is no privity of contract between an individual citizen and such water company which would enable him to maintain an action for injury sustained through a fire and resulting from a failure of the water company to perform its contract with the municipality.

That municipalities themselves are not liable to citizens for neglect in the matter of private water supply is established by an unbroken line of authorities. First, because there is no contract relation between the propertyowner and the municipality; and, second, because, as one authority expresses it, "no recovery in any event can be had where the negligence of the municipal corporation consists in failing to perform a legislative, judicial or discretionary duty, or in simply performing such a duty in an improper manner. A recovery can be had against a municipal corporation only where it negligently performs or negligently fails to perform a duty in its nature *ministerial*, and then only in cases where the municipal duty is imposed by law." 8 Wait's Act. and Def. 938.

"The law (Mott vs. Cherryvale Water and Manufacturing Company, 29 Pac. R. 989. 48 Kan. 12) which authorizes cities to contract with individuals and companies for the building and operating of waterworks confers no powers upon a city to make a contract of indemnity for the individual benefit of a citizen or resident of the city, for the breach of which he can maintain an action in his own name."

The Paducah case already referred to (Paducah Lumber Co. vs. Paducah Water Supply Co.) is the only one, as stated, in which the water company was held to be liable.

WATER WORKS IN THE UNIVERSAL SCHEDULE.

It will be observed that the schedule recognizes efficiency and reliability of water works in the following order:

1. Gravity, with an "effective head" and "volume" at the hydrants. For recognition in schedule rating the reservoir should contain at least five days' supply for domestic and fire service, which should be maintained and is more reliable if supplied by hydraulic pumps, in duplicate, from a river or other inexhaustible supply, not liable to drought. If the pumps, whether steam or hydraulic, are arranged to secure also direct pressure in emergency, as already explained, both kinds of service may be secured.

2. Hydraulic Pumps in duplicate, with storage reservoir or tank stand-pipe of ten hours' supply for domestic and fire service.

3. Steam pumps, in duplicate, with a tank stand-pipe or storage reservoir of ten hours supply for domestic and fire service.

4. Direct pressure from Hydraulic Pumps, in duplicate, without tank stand-pipe or storage reservoir.

5. Direct pressure from steam Pumps, in duplicate, without tank stand-pipe or reservoir.

A reservoir system is preferable to all others, and insures uniform pressure in pipes, involving less danger of breakage. While a large reservoir is desirable for storage purposes, however, it is not indispensable for fire purposes. A reservoir sufficient to hold a supply for both domestic and fire service of ten hours would probably be ample for extinguishing any fire. As already stated, one million gallons storage will supply eleven, standard, 250 gallon, fire streams for six hours, and for the ordinary city up to 15,000 inhabitants, a million gallons could be considered an ample reserve of storage for fire purposes.

Fire-proof Pumping Station. It would seem unnecessary to state that the building on whose existence the safety of a city depends should be safe from fire and separated from dangerous manufacturing or other hazards and especially from Electric Lighting Stations. It will be observed that charge is made (item No. 8) for an electric light station or other special hazard in the pump-house or exposing it. It is a grave question if this charge ought

not to be higher, even to the extent of making the "key-rate" of a city having a direct pressure system, so jeopardized, higher than that of a town without any water works at all, in view first, of the fact that such a town afterwards gets credit for individual risks in proximity to hydrants to the extent possibly of 15% (see Nos. 155, 156), and, second, of the fact that a company's conflagration line in the direct pressure town would have been increased by reason of the pressure, but all benefit of the system lost if a fire destroying the pump-house should happen to be coincident with the raging of a conflagration in the city.

Cisterns. In Detroit, small cisterns or reservoirs, holding 7,000 gallons or more, are distributed throughout the city, notwithstanding the pipe system, and would admirably supplement a broken street main. In some cases they are of oblong or sewer shape, of cemented brick.

As stated elsewhere, in all cases where dead ends are necessary in the outskirts of the city, a cistern or reservoir is provided at the end, so that in blowing off the dead end the waste water is husbanded for fire purposes.

CAPACITY OF CISTERNS OR STAND-PIPES IN U. S. GALLONS

For each 12 inches of depth.

The following table will enable any one to estimate the capacity of tank stand-pipes or cisterns of cylindrical form in U. S. gallons for each 12 inches of depth:

4 feet diameter,	94	11 feet diameter	711
5 " "	147	12 " "	846
6 " "	211½	13 " "	993
7 " "	288	14 " "	1115½
8 " "	376	15 " "	1322
9 " "	476	20 " "	2350
10 " "	587½	25 " "	3672

For example, a cistern 25 feet in diameter would contain 3672 gallons for every foot of depth; and if 10 feet deep, 36720 gallons, or 918 bbls.

A simple rule may be stated as follows: To find the contents in U. S. standard gallons *for each foot of depth* of a cylindrical cistern with a circular base, *multiply the square of the*

*diameter (in feet) by $5\frac{7}{8}$; the product will be the contents in gallons.**

For example, a cistern 20 feet in diameter and 10 feet deep would contain $20 \times 20 \times 5\frac{7}{8} \times 10 = 23500$ gallons (see table above).

*The cubic contents in feet of a cylinder like a cistern are obtained by multiplying the area of the circle by the depth in feet. Inasmuch as the area of a circle is obtained by multiplying the square of the diameter by .7854, and inasmuch as a cubic foot of water contains 7.48 gallons, it is only necessary to multiply the square of the diameter by the product of $7.48 \times .7854, = 5\frac{7}{8}$, to obtain the result in gallons, without the longer computation.

N. B.—In the preparation of the preceding pages it was my aim to collate, in condensed form and by systematic arrangement, such important information regarding water works and street mains as is usually to be found scattered throughout the pages of expensive treatises on hydraulics and water supply, whose authors generally and, perhaps, naturally give more attention to domestic service, potableness, etc., than to fire service.

Technical phraseology has been, as far as possible, avoided, in order that the property-holders of a city may understand its recommendations when considering the introduction or improvement of water works. Impressed with the value of a thorough canvass for the criticism and opinions of others, such as was made in the case of the Universal Mercantile Schedule, the writer decided to send the pamphlet "in proof" to Hydraulic Engineers, Fire Chiefs and other experts throughout the country, with the result that he is under obligation not only to the gentlemen quoted throughout the pamphlet but, also, to many others and especially to Mr. Freeman, to whom he has been largely indebted, as numerous references throughout the work indicate. Indeed, so wide has been the writer's canvass for criticism and so materially has the article been improved by drafts made upon the wisdom of others that he feels more like a compiler than an author. Whatever he may lose in credit for originality, however, will be compensated by the gratification of an honest desire to furnish valuable and reliable information, in a concise form, and by the conviction that those who make use of the treatise will rely thoroughly upon its statements, for the reason that it involves the consensus of judgment of many able experts, rather than the individual opinions of one man.

WRITING POLICIES.

The agent cannot be too careful in writing policies. He should, in all cases where the circumstances permit it, confine himself to the carefully prepared forms furnished by the Company for his guidance and avoid carelessly worded contracts, written on the spur of the moment, or to gratify the unreasonable whim of some over-particular customer who, perhaps, fancies that forms are intended to protect the company, at the expense of the assured. No greater error could be made. An honorable company seeks only to protect itself from fraud and from the consequences of stupid blunders, and it will be found, in nine cases out of ten, that the clearly worded policies of the company will protect the assured better than any he is likely to frame for himself. A company desirous of securing business is not apt to be so short-sighted as to insist upon inequitable or unfair forms, for no honorable company desires disputes or misunderstandings, in cases of loss, which might be avoided by definite and unmistakable contracts.

It is well to bear in mind always, when writing a policy of insurance, that though it may lie forgotten in some bureau drawer or office safe for years, it will *become, in case of fire, as important as a deed for the same amount.* Nothing can be more embarrassing for all concerned—the assured, the company and the agent—than to discover, at such a time, that the instrument to which they must refer for a definition of the respective rights and obligations of the parties is indefinite, illogical, and inconsistent, not only with the policies of other companies on the same property, *but possibly with its own terms*, and that each party must make disagreeable concessions in order to harmonize a contract which might just as well have been clear and explicit from the start.

An agent will sometimes write a policy for five thousand

dollars with less care than he would a check or note for fifty, notwithstanding that within twenty-four hours the policy may become a claim for its whole amount! Such indifference is inexcusable.

Before writing a policy select a form suited to the risk, and *unless it conflicts, in important respects, with existing insurance in other companies on the property*, follow it carefully and as literally as the facts and circumstances will allow.

All the insurance upon the same property, however, should be concurrent, that is, the contracts or policies of all companies insuring it should read alike, with regard to the description of the property, the different classes of property covered, and the proportion in which the policies apply to or cover them. The policy of one company, for instance, on a stock of "groceries, dry goods and crockery," should not cover *groceries and crockery*, that of another *dry goods and crockery*, while a third, possibly, covers *all three*. Nor should the policy of one company cover a specific amount on each, while another insures all under one sum.

Non-concurrent policies are always productive of dissatisfaction in case of loss, and seriously embarrass adjusters. The assured, moreover, nearly always suffers, since the companies are protected by conditions in their policies against the non-concurrent contracts of others, and where the assured is so short-sighted as to conceal the wording of subsisting insurance on his property, that he may secure a policy covering property not mentioned in it, he generally secures loss to himself. The better way is to have all incorrect policies corrected, and the whole insurance made concurrent. The companies themselves would much prefer this plan, and cheerfully undertake the trouble. When the agent cannot obtain copies of other policies on the risk, he should either decline the risk or insert the following form of permit for other insurance: "$..... *other insurance permitted, it being a condition that the whole amount thereof shall, so far as this policy is concerned, be considered as written concurrently therewith*," being particular to explain the purpose of the clause to the assured. Even when the other insurance is concurrent he should write the permit in the following form: $........... *other insurance permitted concurrent herewith.*

Insert the amount of other insurance. Do not permit an indefinite amount. An agent should exercise the same caution in limiting the total amount of insurance by all companies on a risk to a safe figure, as compared with values, as when he carries the whole amount in one policy. Investigate carefully all applications for permitting additional insurance, both as to value and concurrence.

Too much attention cannot be paid to this important matter of the concurrence of contracts, and the agent will do well to explain to an applicant that it is *to his own interest* to have all of his policies read alike. Non-concurrent policies are usually the result of carelessness on the part of the insured or of the agent, who, having failed to protect a particular class of property in one policy, seeks to remedy the omission by taking out another in some other company. Efforts have been made to harmonize the differences which invariably arise in such cases, but without success. No rule of adjustment which would probably be acceptable to all the companies interested will cover non-concurrent contracts so as to protect the assured.

Take, for example, the following illustration. A party having $5000 worth of flour and $5000 worth of grain secures an insurance of $5000 on *flour* with company A. Finding that his grain is not protected he applies to company B for $5000 insurance, but insists on having it worded on *flour and grain*, declining to inform the agent of B how his other policy reads (he ought not to succeed in obtaining the insurance under such circumstances, but we will suppose that he does), and a total loss occurs. If company A should decline to pay over one-half the loss on flour, claiming that he has an insurance of $10,000, and its proportion is one-half, he will lose $2,500. Whereas, if both policies had been concurrent and he might have had them so without paying any more premium—he would have been fully and unquestionably covered!

Having decided upon the proper form, it should be clearly copied in the register, *from which entry the agent should copy his policy.* The **full name of applicant should be written in all cases, and the day of the month of commencement and termination, and the amount should also be written in full,** and very plainly.

Under no circumstances should a policy or renewal be dated back

to cover expired time. The contract must not be made to commence *before the day on which its terms are agreed to*. If it is desirable, for any reason, to have all of the policies on a risk expire on a particular day, the policy may be issued for "the time" from the date of the contract to the day of expiration.

It sometimes happens that a party entrusted with the care of insurance on property for the owner, will desire to cover up an oversight on his part by having a policy or renewal dated back. The agent should decline to do so in all cases. The precedent would be an objectionable one to establish.

There should be no erasures in a policy or renewal. If a mistake is made, do not attempt to erase it, but use a new blank, and return the incorrect one as "spoiled" to the company with the next monthly account.

The Numbering of Policies. Each policy should have a particular number by which it is to be always afterward known and designated, even though subsequently canceled. *Under no circumstances should the same number be given to another.* All policies and renewals must be numbered in successive order.

Lost Policies. If a policy is lost do not issue a duplicate policy, but cancel the lost policy pro rata and take a lost policy receipt for it. Then write a new policy for the unexpired time of the lost policy, and make the premium the same as the return premium on the lost policy. This will involve no financial transaction with the assured and will keep the records of the company straight.

The agent should not give a number of his own to a policy written at the office of the company, as it would interfere with the accounts of the Company. Such policies should always be known by the numbers they bear. The agent should not skip any number of his series because of the issue of such a policy.

The monthly account should show a continuous list of the policies issued. Do not skip or omit any numbers, but fill them in, in all cases, writing opposite each the particulars of the policy or an explanation of their omission, as, for instance, "canceled at request of company," "canceled, no premium paid," "not taken," etc., as the case may be.

It is not necessary for an agent to commence his series of policies with number "1." He may commence at any arbitrary

number, 100, for instance, being careful to keep the series perfect thereafter. *Where he is appointed in the place of a former agent of the company removed or resigned, he should commence his numbers where such agent stopped writing*, or, if he desires to keep his record separate, he may commence with any number *higher* than the last policy issued, but never with one lower, which would result in duplicate numbers.

Never make verbal agreements. The policy or renewal must be the only contract of insurance. All tacit understandings or oral agreements as to what property is or is not insured by the policy are inadmissible, under any circumstances. Let the plainly written policy be the only reference, and if it does not clearly describe the property, *have it corrected before a fire.*

All policies should accurately describe the building insured or containing property to be insured, as follows, for example, "the *two story, brick, metal roof building with metal cornice and coped walls*," or, "the *one story, frame, shingle* roofed building," or otherwise, as the case may be.

The location of the risk must be clearly and definitely described in the body of the policy, by street numbers, if possible, or, in the absence of street numbers, by the side of the street on which the building is located, and the names of cross streets between which it is situated, and distance in feet from the nearest; or, in the absence of cross-streets, by lot and block numbers. Descriptions of location to the company should be uniform; for instance, one risk should not be described by street numbers, and another, adjoining it, by lot and block number. Such discrepant references make it difficult for the company to keep a register of its lines exposed to one fire. Indeed, too much care cannot be used in particularly describing the location of risks, *especially when the building insured is one of a number of similar ones owned by the same party.* In case of a loss, under such circumstances, on a building *not insured*, claim might be made for it under an indefinite policy *intended to cover a different one.* When a building cannot be clearly and unmistakably designated by the written description, the policy should refer to a diagram showing it; as "*building marked* "*A*," (*or* "*No. 1*,") *on diagram on file in the office of the company, which is hereby made a part of this policy.*"

Never write a policy on a building described as indefinitely as the following, for example, "*situated in the town of Jefferson*," or "*on the south side of Adams street.*" The policy should describe the property as accurately as possible, and though not with the particularity of a deed of sale, yet with an accuracy which will, in case of loss, admit of no question as to the particular building intended.

An agent has no power to waive any of the printed conditions of a policy, and he must not attempt to do so by any written clauses, or by erasing any of the printed matter. Where the conditions are objected to, in any case, he should advise with the company, and take no action without their written advice.

As a rule, the printed conditions of policies are intended to protect the company against fraud, and every honest claimant's interest is better protected by their presence than it would be by their absence. Take, for example, the condition prohibiting other insurance without the consent of the company. Could anything be more dangerous to the public interest or safety than to permit a dishonest person to insure his property for an excessive amount and without reference to its value; and does not everyone feel better satisfied in knowing that his next door neighbor is restricted from keeping dangerous explosives and combustibles in his building by an insurance policy, though it prohibits them on his own premises as well? The conditions in the policies of honorable companies are actually inserted *in the interest of the assured*. There can be little question but that the restrictions in the policies of insurance companies against the keeping of dangerous chemicals and explosives in buildings insured by them have had more to do with preventing serious catastrophes in cities than have prohibitory laws on this important subject. Laws are easily evaded and are not always enforced, but the policies of conservative and careful companies are withheld by them until a thorough and intelligent survey of the risk has been made by their inspectors; such inspection is very apt to bring to light the dangerous features of a risk, and even if it should fail to do so, the knowledge by the applicant for insurance that his policy will be voided by a breach of its conditions, if a fire should result from the keeping of prohibited articles, has the effect of excluding them.

Probably the objections urged by most persons against printed

conditions in policies arises from an ignorance, on their part, of the fact that companies would be protected by law, in the absence of such conditions.

The interest of the assured must be clearly stated in the policy, if other than the unconditional and sole ownership. The following are the conditions of standard insurance policies:

This entire policy shall be void if.......................the interest of the insured in the property be not truly stated herein; ....

This entire policy, unless otherwise provided by agreement indorsed hereon or added hereto, shall be void if .... the interest of the insured be other than unconditional and sole ownership; or if the subject of insurance be a building on ground not owned by the insured in fee simple; or if the subject of insurance be personal property and be or become incumbered by a chattel mortgage; or if, with the knowledge of the insured, foreclosure proceedings be commenced or notice given of sale of any property covered by this policy by virtue of any mortgage or trust deed; or if any change, other than by the death of an insured, take place in the interest, title, or possession of the subject of insurance (except change of occupants without increase of hazard) whether by legal process or judgment or by voluntary act of the insured, or otherwise; or if this policy be assigned before a loss.

The insurance of interests smaller than that of the fee simple is so often attended with moral hazard and danger, that companies have been obliged to protect themselves by a clause like the preceding in their policies. It is evident that if such interests as those of the mortgagee, and the minor interests of the life-tenant, lease-holder and others, all of which are insurable at law, could be insured, as well as the interest of the owner in fee, a property might be insured by two or more different persons, for many times its value, each one taking a policy upon it for the full value, and a dangerous moral hazard result. Where several different interests require protection, all of the parties *should be joined in one policy.* This enables a company to restrict the amount of insurance to a safe proportion of the value and protects each interest as well.

When the insurance is for the owner in fee only, the written portion of the policy should commence with the possessive pronoun "his," "her," or "their," as the case may be, to indicate the interest insured; as, for example, "$...... *on his two story, brick, metal roof building*", *etc.*

The interest of a mortgagee must not be insured direct and separately. He should, in all cases, be joined with the mortgagor

or owner. The policy should be made in the name of the owner, in the usual manner, and with loss, if any, payable to the mortgagee, as follows: "*Loss, if any, payable to John Doe, mortgagee.*"

In case the mortgage should be afterwards paid by the mortgagor, the following endorsement may be made; "*The interest of John Doe, mortgagee, having been satisfied, the loss, if any, is now payable to the assured.*"

Do not consent to Chattel Mortgages on Personal or Movable Property. Too many interests in movable property embarrass adjustments, and a presumption of moral hazard lies where an owner's affairs are in such an unsatisfactory condition that he is obliged to mortgage his personal effects.

Life Estate. Care and good judgment should be exercised in insuring this interest. The tenant for life who has insurance for the full value of property, of which he has only the use for life, has often much to gain by a fire. There is, under such circumstances, usually little incentive to carefulness on his part; indeed there is apt to be a strong incentive to fraud.

The value of a life estate is not easy of ascertainment, and, moreover, decreases each year, and the better way, where all parties consent to the arrangement, is for all interested—both the tenant for life and the ultimate owner—to be joined in the policy, with a condition in the policy that, in case of loss, the money is to be applied *to rebuilding or restoring the property, a designated payee being mentioned in the policy.* This protects all interested. Another way is for the ultimate owner and the tenant for life *to agree as to the proportion of the insurance money each is to receive, in the event of loss, and to have it plainly stipulated in the policy;* as follows, for example, "*It is understood that, in case of loss under this policy, the same shall be payable in the following proportion, viz., one-fourth to John Doe and three-fourths to Richard Roe.*"

Leasehold. This interest is not covered by a policy unless expressly mentioned by it (see lines 17 and 18.) Where the owner of a building which stands on leased ground, and which will revert to the owner of the ground, by the terms of the lease, at the expiration of it, seeks insurance, it should be remembered,

as has been before stated, that his interest in the property is not more valuable than *the right to use it for the time the lease has to run*—say what would remain, after deducting from a fair rental, such expenses as cost of repairs, taxes, ground rent, defaulting tenants, declining rents, etc. His interest depreciates in value with each year, and when within a few years of the expiration of the lease, the amount of the insurance should be very light, unless both owner and lessee are joined.

It is, sometimes, urged that a lessee will let a building deteriorate, for want of repairs, as his lease approaches its termination, so that, at the last, he will not lose much, and may, therefore, be safely insured; but this argument overlooks the danger common to all property, the owner of which has no inducement to carefulness. Any insurance, also, is more than likely to be *over-insurance.*

Where such an interest is insured, the agent should satisfy himself as to all the circumstances of the case—the length of the lease (which should be stated in the written portion of the policy)—whether by its terms the building reverts, at expiration, to the owner of the ground, or is to be paid for by him at a fair price, and whether the lease is renewable on equitable terms—all of which are important in deciding as to the lease and its value and the desirability of insuring it. If it seems desirable to issue a policy, advise the Company in the Daily Report as to all the facts.

Insurance of Leases (for form, see index.) The value of a lease is the amount which a tenant collects from sub-tenants over and above what he pays the owner and is the profit on his lease. Leases are seldom insured outside of large cities, where rents are high and where the lessee of a large building, in a desirable location, who has secured it for a term of years at a low figure, can frequently sub-let to great advantage—sometimes for thousands of dollars per annum more than he himself pays. In such a case, he has an interest which may be insured. He would clearly be a heavy loser by a fire destroying the building and canceling his leases. Great care should be taken, however, to see that the applicant has a good bargin. He may have taken the building when rents were high. He may not have secured tenants enough to fill it. Trade may have changed

from the locality. It must be remembered that we do not insure except against *actual loss* of property.

Insurance on Rents. (for form of policy, see index.) Rents are, also, a legitimate subject of insurance. The owner of a well-tenanted building receiving annual rentals for his property, clearly loses something more than the mere cost of the building in case of a fire, if his leases, by their terms, are canceled by such fire.

The amount of the monthly payment, to be made under the policy, in case of fire, should not be more than one-twelfth ($\frac{1}{12}$) the amount of the policy, as this is the basis on which the rate is made. Where a large proportion of the policy is payable per month, a proportionably higher rate should be charged, as a party might draw the whole amount of a policy, in case of a temporary loss of rents for only two or three months, and the company suffer a total loss, under its policy, for a mere temporary damage to the building.

Only an actual loss of rents is to be paid for. The Company should not pay rent for rooms which *were vacant, at the time of the fire, and for which no tenants could be secured.* To do so would be to offer, in some cases, a strong incentive to fraud.

Title of Property in the Name of a Wife. Although the husband has an insurable interest, at law, in the property of his wife, the condition of the policy requires that it be insured in her name, or, if in his name, that his interest be plainly stated in the policy. *A wife has no insurable interest, at law, in the property of her husband.*

Property in the hands of a Sheriff or U. S. Marshal. Do not insure without the consent of the Company first obtained. A serious moral hazard is often involved, especially in cases of seizure for frauds on the revenue, as in the case of whiskey, tobacco, etc. Fires are sometimes resorted to by unprincipled parties to cover evidences of guilt.

Assignee in Bankruptcy. While it may be claimed that the danger of moral hazard is past when a bankrupt assigns his property, for the benefit of his creditors, it must also be remembered that no one, after such an assignment, has that interest in the preservation of the property which is common to unem-

barrassed ownership and so indispensable to ensure the care upon which the underwriter relies for his prospects of safety. Indeed it might, in some cases, benefit all concerned—owner and creditors alike—if the property should burn with a full insurance. The agent should, therefore, decline to insure, under such circumstances, without fully satisfying himself as to the honesty of all concerned. Not over three-fourths of the actual *cash value* should be insured, in any case, and, as a rule, not over one-half such value.

For Whom it may Concern. Decline to insert this clause in a policy. The names of all interested should be inserted in full. Agents and property-holders are apt to overlook the objection to this form, forgetting that we insure *the individual* against loss on his property, and not the *property itself*. Insurance is a contract of indemnity only, and no matter how good, physically, the risk may be, we would not insure an *unsafe man*. For this reason we must know whom we insure, that we may guard against fraud.

Insurance of "Agents" instead of Principals. Never insure an agent on the property of his principal. The policy should be in the name of the owner, but *may be made payable to the agent*, if it is desirable to do so, on account of the non-residence of his principal or for other reasons.

Insurance of the Insurance Agent's own Property. The Company will be pleased to write policies for any of its agents on desirable risks belonging to them. An insurance policy written by an agent on his own property, however, is void at law—a man not being able to make a contract with himself—a fact which the agent should know for his own good, and which it is due to him here to state. He should forward his application to the Company, and may rely on immediate attention to his request and a reply by return mail.

"Estate of," "Heirs of," etc. The property of a deceased person, which has not been divided or which does not pass by will or by law to the heir, should be insured in the name of the estate. The expression "estate of," so frequently used in insurance policies, has strictly no legal significance, and is indefinite. It is, however, susceptible of explanation in case of loss, and is a very common and convenient expression for insurance policies.

To insure the "heirs" of a person is objectionable, unless the loss is made payable to some definite party, such as the administrator, as it may be a question, in case of loss, as to who and where they are, and it might be claimed that the company should be responsible for the discovery of them. They are sometimes scattered in different parts of the country, and their release receipts, in case of loss, might be difficult to procure, unless at such expenditure of time and trouble as would prove a serious inconvenience.

Commission Clause "Merchandise Held in Trust or on Commission, or Sold but not Delivered." "*Held in Trust.*" This phrase is often misconstrued, and is erroneously supposed to cover property merely left in the custody of the assured, for which he is not responsible, in case of loss, and of which he is only a "bailee," and not a "trustee."

"A 'trustee' is the legal owner of the property, which he is bound to convey, use or apply, for the benefit of another, but neither in technical nor ordinary language is a man called a 'trustee' because some article has been left at his house or store, to remain there until called for."

This clause does not cover goods held on storage, if insured in the name of the warehouseman and not in the name of the owner. The policies of companies require that goods held on storage must be specifically mentioned and insured as such.

"*On Commission.*"—This phrase is intended to protect, and does protect, property bought or sold under orders or commissions of third parties to the entire value of the goods, not exceeding, of course, the amount insured thereon.

"*Sold but not delivered.*"—"What constitutes 'delivery' has been an open and much discussed question, and a very general misapprehension exists in the minds of merchants on the subject. If, after sale, the vendor is bound by contract or custom to deliver the goods, his policies should and do protect him, but with reference to a future delivery, agreed upon between the parties, unless such an interest is retained by the vendor as will ensure his care of the property, the insurance of it is not apt to be a safe undertaking." It must be remembered that we do not insure the *goods*—if we did it might be a matter of indifference to us as to who had charge of or owned them. We insure

the *owner* against any loss he may sustain by reason of the destruction of the goods, and, as the safety of property largely depends upon the character of the owner for honesty and carefulness, the company should always know when a change of ownership takes place, and be in a position to withhold its consent if necessary.

The following extract from the report of a Committee of the New York Board of Fire Underwriters will be found to still further explain the matter:

"We do not know why the seller should be relieved from all responsibility for care and safety of the goods, except fire insurance, which he or the Broker seems to suppose he may hold and trade off in the sale. If, after sale, he is bound by contract or custom for delivery, we believe it right that his Policies shall still protect him. We may not know whether or not his agreement for a future delivery has been made specially to hold the insurance, but we do say that if the insurance is thus necessary for the seller's protection, so *should be all other needed care and responsibility* for the goods until they shall be actually delivered. It is a technical wrong-wording to say, *we insure the goods*, and it leads to further saying and thinking that if we insure the goods, what matters it who may be the owner, if the fire be honest. Insurance is a personal contract between the company insuring and the *person*, owner or manager of the property described. We insure HIM against any loss HE may sustain by fire to the property. *We issue our Policies on our faith in the assured and his care for the property*, and we cannot suffer him to abandon any of that care of ownership whilst our Policy may be liable for a loss."

The actual removal of the property from the custody and premises of the vendor is not necessary to constitute delivery. "If goods are sold in a store, separated and weighed or numbered—if that be necessary —and put into a parcel, or otherwise made ready for delivery to the buyer, in his presence, and he request the seller to keep the goods, for a time, for him, this is so far a delivery as to vest the property in the goods in the buyer, and the seller becomes the bailee of the buyer. If they should be burned while so held, the *buyer* would lose them." (*Parsons on Commercial Law.*) In some cases, as in the purchase of lumber, for instance, slight acts, such as touching it or even going near it and pointing it out, are sufficient to constitute delivery. The delivery of a negotiable warehouse receipt or of an order on a warehouse-man or third party having custody of the goods, constitutes delivery and the interest of the seller passes to the buyer. So, also, the delivery to the buyer of the key of a warehouse containing the goods would be delivery.

The illustration has been made use of by a writer on commercial law that if a certain number, say fifty, out of two hundred trees should be selected by a buyer and purchased of a gardener, though left growing in the grounds of the seller, he (the purchaser) would be the owner of them and lose by their destruction. If, however, he should purchase fifty of the number without denoting his preference for particular ones, they would, up to the time of such selection, remain the property of the seller, who would lose them if destroyed.

It is sometimes customary among brokers and merchants to attempt to sell a remaining interest in an insurance policy by inserting in sale notes words like these: "Buyers to have the benefit of seller's unexpired fire insurance without charge." This may be agreed upon *as between the parties, but unless the transaction is completed by obtaining the consent of the insurance company to the transfer*, such clauses in any contracts for the sale of goods are powerless to convey an interest in the policy. In such a case it takes *three* to make a bargain.

The following is the resolution of the New York Board of Fire Underwriters as to this important point of goods sold, with an agreement as to a future delivery:

"*Resolved*, That claims for loss of goods sold where it is truly set forth in the 'proofs of loss,' that in the sale note or contract of sale, there was in writing the following words (or others to the same effect)—'*Deliverable at the option of the buyer at any time within........days*,' or, if an order on the warehouse has been given, and such order was made to read '*Deliver to A. B. & Co.*, (*the purchaser*), *at any time within........days*,' (or words to that effect), the Insurance Companies, members of 'THE NEW YORK BOARD OF FIRE UNDERWRITERS,' will recognize the assured in the Policy named as the owner of the goods within and up to the time of such limitation, provided the number of days is fixed at the time of sale, and *then written in the contract or order;* and provided that the buyer shall not have presented his order and had the goods placed to his or other account in the store."

To collect the amount of insurance, in case of loss, it is necessary that the claimant should have an insurable interest in the property at the time of the fire, and it must be plain that the seller, who has sold property and is not liable to the buyer for it, *cannot take the required oath of interest. His responsibility for the preservation of the goods has ceased.*

Sold but "not Removed from Store." Decline this form. It is designed to evade the legal interpretation of the term "sold but

not *delivered.*" As before explained, actual removal is not a necessary incident of delivery. No one should be permitted to insure that which he does not own, and for which he is not responsible, in case of loss.

Re-insurance. Policies reinsuring other Companies must not be issued without first obtaining the consent of the Company. Wherever practicable the policy should be issued direct to the property-holder. It is, however, sometimes admissible to re-insure a company having a larger line than it ought to carry. The agent should be very careful, in such cases, to assure himself that the company dividing its line is not doing so under a concealed apprehension of danger, and especially should he guard against re-insurance, where any moral hazard is involved. The re-insurance should always be a question of *line* only, and never of *risk* or *rate*; that is, only to be effected for a company desiring to be re-insured where the line held by such company is too great for it to carry and not where the rate is too low, or the risk an undesirable one. In reporting such risks by daily reports be particular to explain all the circumstances, and to state the *amount of insurance retained by the re-insured company, after deducting all re-insurance.*

The agent should assure himself, also, that the re-insuring company is not getting rid of the *poorest portion of a risk*, by re-insuring it at the "round rate" of the whole. We would not re-insure *barns*, for instance, at the round rate for farm property, where the re-insured company retains the *dwelling.*

An agent of two different companies cannot re-insure one of them in the other. Such a policy would be void unless approved by the company issuing it. An agent cannot make a contract with himself, either personally or as an agent.

Under no circumstances do we wish an agent to issue the policy of this company for a larger amount than is meant to be retained, even when re-insuring the excess in some other company. Such a practice virtually amounts, in many cases, *to a guaranty of the policy of a weaker company without remuneration*, since, in case of loss, we would have the full amount to pay and take our chances of recovering any portion of it from the re-insuring company, which might fail by an extended conflagration involving the destruction of the property.

We clearly lose, also, in the case of re-insurance the expenses of commission, taxes, etc., paid by us on the premium.

In those cases where it may be necessary or advisable to re-insure our lines, we prefer to do so at the principal office.

Where agents cannot place their surplus lines, they will find the company, at all times, ready and willing to assist them by placing desirable risks in other companies, securing for them, if possible, the usual commission.

Do not write a "Valued Policy," *i. e.*, one in which the value of the subject insured is mentioned. If the written portion of a policy fixes the value, there is little hope of escaping the payment of the amount, even though it be above the true value of the property. In all cases the value should be left to be determined after the loss. It is desirable, however, in some cases, to fix a *limit of value*, beyond which claim cannot be made in case of loss. Especially is this the case where the property has a fancy value, not well established by rules of trade; such property, for instance, as paintings, valuable horses or other live stock, collections of curiosities, mineral, geological or ornithological cabinets, rare books, statuary, etc. When insuring paintings or engravings, where two or more are insured under one amount and not specifically, the following clause should be inserted: "*In case of loss, no one painting or engraving to be valued at more than $....*," (here insert amount), or the following: "*In case of loss, no painting or engraving to be valued at more than cost.*" Neither of these clauses fixes any value. They merely limit the maximum amount of claim.

Where horses or other live stock are insured, an amount should be named beyond which claim cannot be made, in case of loss, on *any one*. This prevents any claim being made for the whole amount, or an undue proportion of it, on a single animal. The number of animals should also be named, and the amount specified on any one should be a fair proportion of the whole; for instance, if $300 be insured on three horses, the amount limited to be claimed on any one should not exceed $100, or *one-third*. Where the amount is not limited to a fair proportion of the whole amount of insurance, the rate should be higher, since we might, otherwise, be virtually carrying several risks for one premium.

Insure the whole hazard—external and internal—or none. It is not uncommon for an applicant, who is dissatisfied with the charge made for an exposure, to offer to carry the risk of the exposure himself, claiming, possibly, that the danger is overestimated; or, on the other hand, he offers that if the Company will insure him against outside dangers, he will run all risk, himself, of a fire originating on his own premises. Such contracts are objectionable. It is frequently difficult to arrive at the cause of a fire, and it will generally be found, after a loss under such a contract, that the company, while it has been receiving *a part only of the premium, has really been carrying the whole risk.*

A Policy should be Specific. A separate amount should be named upon each building insured, and a specific amount on merchandise in each. Under no circumstances should two or more buildings or their contents—unless they communicate *without iron doors*—be insured under one amount, without the average clause. Insurance should always cover specifically *on each side of an iron door.*

If two or more buildings, insured under one amount, be so situated as not to burn necessarily by one fire, the company would clearly be carrying two or more risks for *one premium*, unless the full value of each is insured, which is neither likely nor desirable.

Never insure a building and its contents under one sum.

When it is necessary, for any reason, to insure two or more buildings or their contents under one sum, the "distribution form" of average clause must be inserted.

Where personal or movable property consists of two or more different classes, it is desirable to insure a specific amount on each class. For example, if insurance is desired on a stock of hardware, tinware and fire-arms, a policy covering a specific amount on each class of merchandise is desirable but not imperative. Such a policy may close with words like the following, after the last division, "*and other merchandise not more hazardous*," to cover small omissions. The policies of all companies on the risk, however, should be *concurrent, and all should be specific or none.*

A policy on household furniture is improved by specific divi-

sions, and, where the insurance is so written, an applicant is more likely to take a sufficient amount of insurance, his attention being called, by the divisions, to the amount necessary to protect him. In case of loss, also, an adjustment is easily and satisfactorily made, the assured having no one but himself to blame if he is insured for an inadequate amount.

Office furniture, fixtures, counters, show-cases, burglar or fire-proof safes, etc., should all be insured specifically, and never included under the same amount with stock.

Druggists' Jars, Bottles, Soda Water Fountains, etc., should also be insured specifically, and separately from stock.

Plate Glass in doors and windows, if more than three feet square, (or nine square feet), and Plate Glass Mirrors should be insured specifically and a higher rate collected (at least double the rate on the building) owing, in the case of windows, to the liability of breakage either by the heat of a fire across a street or in a neighboring building, or by firemen in order to enter the building itself in case of fire.

Out-houses, Yard Fences, etc., should be specifically insured. Fences should pay at least one per cent., as they are nearly always broken down, in case of a fire.

Curiosities, Collections of Birds, Cabinets of Mineral or Geological Specimens, Collections of Coins, etc., if insured, must be for small amounts, and specifically, a limit of claim being written in the policy as to any one specimen, in case of loss.

The following property must not be insured, under any circumstances: *money, bullion, bills, notes, accounts, deeds, evidences of debt, securities of property of any kind, or manuscripts.* An agent of intelligence will readily understand why.

Avoid all ambiguous or incomplete language in writing policies, such as the indefinite words **"articles," "effects," "property," "contents," "household goods,"** etc.

"Live Stock." Specify whether horses, cattle or sheep.

"Goods," "Wares," etc. "Merchandise" is a preferable term to either 'goods' or 'wares,' as it implies property *kept for sale.* "Property which is purchased and taken out of the market to be applied to the ultimate use for which it is intended, ceases to be 'merchandise.' Thus, a gentleman's wearing apparel, the

furniture of his house, his coach and horses, and the wines and liquors for use in his family, are not 'merchandise.'"

"Articles." When this term is insisted upon by the assured, it should be qualified by the addition of such words as "*kept for sale*," or "*of merchandise*," to prevent claim being made on show-cases, office or store furniture, fixtures, etc., all of which might be claimed to be "articles," and which should be specifically insured.

Avoid abbreviations, such as "Do." or "Ditto." "etc.," "&c.," "etal.," and others. According to Lord Coke, "&c." means "whatever else ought to have been expressed." We have no objection to insure "whatever else ought to have been expressed," but *we desire to have it expressed*, that we may know whether it ought to be insured.

A policy should never be worded as follows, for example, on a "Saw Mill," a "Flour Mill," a "Starch Factory," etc., but should be written —"on the brick, metal roof building *while occupied as a saw mill*,"—(flour mill, or starch factory, as the case may be). It has been claimed that a policy on a "saw mill" covers not only the building, but also the saws, engine, boilers, machinery, and, in fact, *everything necessary to make it a "saw mill," complete in all its parts.*

Do not make too many endorsements on a policy. It is best to write a new one when it becomes filled up with too many endorsements. Clean contracts are desirable.

Do not renew a policy which has been materially altered in any important particular, as of amount, name, location, etc., by renewal receipt. It is best to write a new policy, and, in this connection, it may be well to state that in reporting a new policy so written, in place of an old one, the fact that it is renewed by a *new policy* not by a "renewal receipt," should be stated in the daily report and in the monthly account.

Never issue a Renewal Receipt which alters the original contract in any important respect, especially in amount. Renewal receipts are not explicit enough in their form, as will be apparent to any one upon an examination of them, to warrant their being used to alter any material terms of the original contract, *especially if such alteration is in favor of the Company, as in a reduction of the amount of its liability.* A renewal receipt may

require extrinsic, collateral evidence to prove it, while a policy proves itself.

Endorsements should never be made upon a Renewal Receipt, but, in all cases, upon the Policy itself. All endorsements, transfers and assignments should be reported on the day they are made, on the small blanks furnished for the purpose.

The policy on a building should always limit the hazard of occupation, by clearly stating it. Such words as "*while occupied as private dwelling*," or, "*while occupied as a grain warehouse*," protect the Company against the consequences of a change of occupation.

It is desirable that definite language should be used. The words, "while occupied as a 'store,' or "for mercantile purposes," or "for a store-house," are not sufficiently definite—*the particular kind of* "store," "ware-house," or "store-house," and the nature of the "mercantile purposes," should be stated. The sale of fire-works, gunpowder, or other dangerous substances, might be claimed to be an occupation for "mercantile purposes." The phrase "while occupied for purposes *not specially hazardous*," though frequently used and less objectionable than many others, is still not so desirable as a particular and plain description of what the occupancy really is. Where the occupations of a building cannot all be given, the phrase "privileged for hazardous and extra hazardous occupation" may be used, as these indicate clearly defined classes, and are preferable to the indefinite phrase "not specially hazardous."

In policies on special hazards, the words "privileged to be occupied for *specially hazardous* purposes" are not sufficiently definite to limit the occupation—*the particular kind of special hazard* must be specified. The term "special hazard" covers a very large class of dangerous occupations.

Do not issue a policy for a premium less than $1.50. A smaller premium does not pay for the use of blanks, trouble of recording, etc. Where the amount is so small that the computed premium, at the rate for the class, amounts to less than $1.50, the agent should charge that amount for it or decline the risk.

Decline to write term policies on mercantile risks. The only risks which should be written for a longer term than a year, are dwellings and farm property. It is sometimes advisable, how-

ever, to modify the rule in favor of *churches*, *school-houses*, *colleges*, *court-houses*, *engine-houses*, and other public buildings *which are not subject to changes of occupation.* All other risks should come up, each year, for consideration and inspection, and it may be suggested, also, to the assured *that his companies should come before him, each year, for consideration.* The rates current in some localities, for term policies, of two annual premiums for three-year policies, and of three annual premiums for five-year policies, are not adequate. They should be $2\frac{1}{2}$ and $3\frac{1}{2}$ annual premiums respectively as already explained. Page 206.

Application and Survey. The policy should close with a reference to the application and survey, which should be signed by the applicant, using the following form, "*Reference being had to the application and survey of the assured, numbered . . . ., on file in the office of the Company, which is the basis of this insurance, and which is hereby made a warranty on the part of the assured.*"

The application should, in all cases, be *signed by the applicant* and *never by the agent*, and it is desirable, also, that the answers to questions should be filled in by the applicant himself. Where the agent performs this task for him, *he is the agent of the applicant for that purpose.*

Gunpowder, Kerosene, Night-work in Mills, Lightning, Fire-works, etc. (For forms, see index.)

REPORTS TO COMPANY.

Daily Reports. Surveys. etc. Let all daily reports be full, with every question answered. When a letter of explanation will place the Company in possession of valuable collateral information and facilitate its consideration of the risk, it should be forwarded—otherwise do not write on a separate sheet. Daily reports are intended to be self-explanatory.

Be particular to answer the questions as to the amount of insurance permitted in other companies, and as to *whether it is concurrent*; the amount of other policies which the Company may have in or on buildings exposed by the risk, and, therefore, liable to burn by the same fire; the value of the property; the length of time the applicant has resided at the agency, and the number of years the agent has known him.

In case the applicant is a "new comer," *be particular to inquire as to his antecedents, and report the facts to the Company.*

In reporting endorsements, transfers, assignments, etc., the same care and dispatch should be observed as in reporting policies. Where assignments are made by filling out the printed forms on the backs of policies, *it is not necessary to copy the printed matter of the form*, it being sufficient to report, as follows, for example, "*policy assigned to John Doe, purchaser.*" In all cases, the agent should state the INTEREST OF ASSIGNEES, whether as purchasers, mortgagees, or otherwise.

In short, the agent should make an intelligent report of the risk, noticing and explaining such points as will be likely to excite inquiry on the part of an examining officer. A brief explanation in pencil on a daily report as to a point of interest will, sometimes, save both Company and agent the necessity of correspondence.

The agent should refer, on all daily reports, to the insurance

map and when the risk is not on the map, he should *state the fact* and make a diagram showing the risk and all buildings exposing it, the widths and names of streets and numbers of buildings. In the absence of such references, lot and block numbers should be given. (See *ante*, page 291.)

All daily reports must be forwarded on the day a risk is made binding or, in case they cannot be sent on the very day, a short letter should be sent, giving the principal particulars of the risk, such as amount, location, etc.

It would be embarrassing, both to the Company and the agent, to have a fire occur before the Company had been notified of its responsibility. Such neglect would be inexcusable. The records of the Company and of its agent should correspond, as nearly as may be, with each other.

All surveys and applications should be signed by the applicant *and never by the agent.*

It is not necessary in reporting policies or renewals to copy any of the *printed matter*. Copies only of the *written portion* should be forwarded, and only the written portion copied in the register.

Insurance Map or Diagram. Where an insurance map is on file with the Company, the number of the building, as before stated, should be noted on the daily report; this will save the examiners in the office of the Company much time and trouble in locating the risk. The agent should also be careful to note, *in pencil*, on his duplicate copy of the map, opposite a building insured or containing insured property, the particulars of the policy—number, amount, and date of expiration.

In this way he will be able to decide intelligently and accurately as to questions of line, and will not be likely to accept too large an amount in any one block. In case the map needs correction, in any respect—whether in consequence of errors of the surveyor, or by reason of the erection of new buildings or the destruction of others by fire—any pains taken to correct it, by forwarding a small diagram (drawn on the same scale as the map, *i. e.*, 50 feet to the inch), which can be pasted in the proper place, will be appreciated by the Company.

In the absence of any map, the agent will find the transaction of business greatly facilitated *by making and forwarding a*

connected diagram of the compact, business part of his town.

By numbering the buildings and retaining a duplicate copy (for making which, the transparent DIAGRAM PAPER FURNISHED BY THE COMPANY will be found to be very convenient), it will only be necessary in reporting risks, thereafter, to refer to the number of the buildings on the map, *instead of making a diagram on each daily report.*

The diagrams furnished by an agent on daily reports, in reporting the risks taken by him in the first three months of his work, would, if pasted together as one connected diagram, frequently make a very fair insurance map of the compact part of his town, and save him much trouble in reporting subsequent risks.

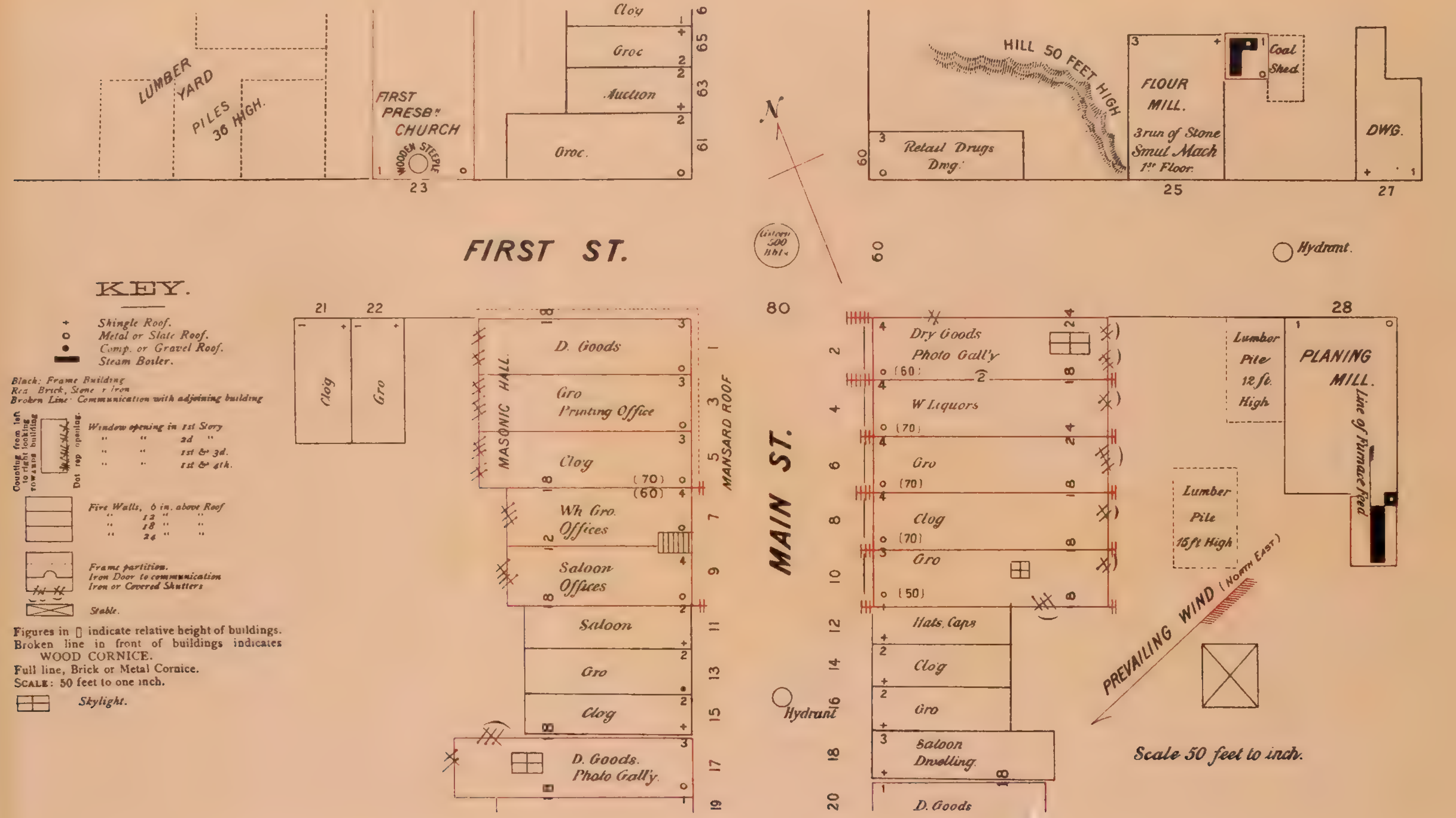
The map need not be drawn to any particular scale, (care being, of course, taken to show the *relative* size of buildings), if the distances between buildings and other measurements be inserted in figures, but should not be on a smaller scale than 50 feet to one inch, which allows $^1/_2$ inch of space to a 25 foot front, and is a very convenient one; and the buildings need not be colored in water color, it being only necessary to draw brick, or stone outlines in *red* ink and frames in *black*.

Care should be taken to show fire-walls extending *through and above the roof*, (a very important feature), wooden cornices, openings in side or division walls (and especially in walls on *exposed sides*), communications with adjoining buildings, material of roofs, etc. (See key to symbols and sample diagram.)

The relative heights of buildings may be shown by figures in brackets, the height of each being marked in feet. A building exposed by one of brick or stone adjoining it, but *of greater height*, is as effectually protected as by a wall extending through and above the roof as already explained, and pains should be taken to show such an important feature of a risk. The fact might decide the Company to accept a risk which it would, otherwise, suppose too seriously exposed.

See the diagram for the manner of showing the relative heights of buildings in blocks.

Where there are windows in that portion of the wall of a



KEY.
Shingle Roof.
Metal or Slate Roof.
Comp. or Gravel Roof.
Steam Boiler.
Black: Frame Building
Red: Brick, Stone or Iron
Broken Line: Communication with adjoining building
Counting from left to right looking towards building
Dot rep opening.
Window opening in 1st Story
" " 2d "
" " 1st & 3d.
" " 1st & 4th.
Fire Walls, 6 in. above Roof
" 12 " "
" 18 " "
" 24 " "
Frame partition.
Iron Door to communication
Iron or Covered Shutters
Stable.
Figures in [] indicate relative height of buildings.
Broken line in front of buildings indicates WOOD CORNICE.
Full line, Brick or Metal Cornice.
SCALE: 50 feet to one inch.
Skylight.
LUMBER YARD
PILES 36 HIGH.
FIRST PRESBN CHURCH
WOODEN STEEPLE
Groc.
Auction
Groc
Clo'g
FIRST ST.
HILL 50 FEET HIGH
Retail Drugs
Drug.
FLOUR MILL.
3 run of Stone
Smut Mach
1st Floor.
Coal Shed
DWG.
Hydrant.
Cistern 500 bbls.
N
MAIN ST.
MANSARD ROOF
MASONIC HALL.
D. Goods
Gro
Printing Office
Clo'g
Wh Gro.
Offices
Saloon
Offices
Saloon
Gro
Clo'g
D. Goods.
Photo Gall'y.
Dry Goods
Photo Gall'y
W Liquors
Gro
Clo'g
Gro
Hats, Caps
Clo'g
Gro
Saloon
Dwelling
D. Goods
Hydrant
Lumber Pile 12 ft. High
PLANING MILL.
Line of Furnace Feed
Lumber Pile 15 ft High
PREVAILING WIND (NORTH EAST)
Scale 50 feet to inch.

building above the roof of one adjoining it, they should be shown in the manner indicated.

Be particular, in all cases, to give *names* and *widths of streets* in diagrams, and unless a street is at least 100 feet wide, the agent should show the buildings on the opposite side from that on which a risk is situated.

Explanation of Diagram. For example, the omnibus building, Nos. 1, 3 and 5 Main street, as shown on the diagram, has a mansard roof and a wooden cornice (shown by the broken line in front of the building), and is three stories high. No. 2 Main street represents a four story, metal roof, brick building, occupied for a dry goods store and photograph gallery, the skylight being shown (see key). A communication between No. 2 and No. 4 is protected by an iron door and the walls of the building rise three feet above the roof. The figures in brackets [60] show that the building is sixty feet high and, as No. 4 adjoining is seventy feet high, the wall between the two is, so far as No. 2 is concerned, an effectual fire-wall (provided the iron door proves reliable). The windows in the rear wall, on 1st and 3rd floors, exposed by the planing mill, are protected with iron shutters, and the wall between Nos. 2 and 4 is 18 inches thick (shown by numerals on the line of the wall).

No. 28 First Street shows a frame planing mill, with a brick boiler-house. The line of furnace feed, however, is in a direct line with the door to the mill (an important and objectionable feature, see under head of "Planing Mills,") and a "back draught" would inevitably empty the contents of the furnaces into the mill. There should either be no opening in the wall between the boiler-house and the mill, or the doors to the furnaces should open at right angles to the mill, or, better still in an opposite direction from the communication.

The height of lumber piles is also shown, an important point. (See under head of "Lumber Yards.")

The agent will notice, in the case of No. 10 Main street, that the iron shutter to the window in the south wall is a valuable protection, in view of the frame row on that side.

CORRESPONDENCE.

Be prompt in replying to all letters of the Company. The

accumulation of open matters, in consequence of unanswered letters, especially in the case of a large company, doing business with thousands of agents, is almost overwhelming, and seriously embarrasses an intelligent management of the business. Daily reports, applications, etc., are often held for such replies until the examining officer, in consequence of the lapse of time and the press of routine work, has grown unfamiliar with the matter, and upon receipt of a delayed letter, has much of his work to go over again.

Where several hundred letters are sent off each day, the accumulation, even of a week, becomes a serious matter.

Be careful to note the references to pages of copybooks showing copies of the letters, when replying to them. It will save much trouble and loss of time.

Do not write about several different matters on one sheet. In all well regulated offices, each letter is filed in its appropriate place. One relating to an account, for instance, with the account department; another describing a risk, with the daily report. Letters have to be read, also, by those having charge of the particular matters to which they refer, and the business of a large office is greatly facilitated if such matters are treated of on separate sheets, which can then be distributed to the proper persons.

It may be well to add, also, that where several different matters are written about on one sheet, copies have to be made for filing; this necessitates trouble and loss of time which will more than balance the extra expense of letter paper saved in using one sheet.

CANCELLATION.

(For rules as to cancellation after a fire, see pages 318, 319, etc.)

The right to cancel a policy, at any time they may so elect, is one reserved by companies in the printed conditions of their policies. In reserving this right—so necessary to protect themselves—most companies accord the same privilege to the assured, as a matter of courtesy, upon the condition, however, that where the cancellation is at the request of the assured, it shall be made at the customary short rates of premium for the time the policy has run, as, otherwise, a party might evade the proper charges

for short risks by taking a policy for a year and canceling, *pro rata*, when no longer needed.

When the Company requests cancellation of any policy even though the reason may not be apparent or sufficient in the opinion of the agent, he should act promptly, forwarding the policy, if possible, by return mail. A company may have ample reason which it does not wish to communicate, or information not within reach of the agent. By any unwarranted neglect, in such cases, an agent would place himself in a position of responsibility to the Company, if a loss should occur. Requests to cancel policies are never made unless for good and sufficient reasons, and never without careful consideration of all the circumstances, not forgetting the inconvenience and embarrassment which such requests may cause an agent.

It is unfortunate that the ignorance of some companies as to the cost of carrying certain classes of hazards should result in a reduction of rates on them to an unsafe figure. No alternative remains to a conservative and intelligent company, in such cases, but to decline the risks and wait patiently until competitors have learned the cost of insuring them, or until property-holders have learned that the policies of low rate companies are not the cheapest in the broad view of a true economy. To do otherwise than decline business at inadequate rates would be to inconsistently ignore the lessons of experience, and experience which is not profited by, has been aptly compared to the stern lamps of a vessel which shed light only upon the track over which it has passed.

It, sometimes, happens that, after taking a risk, the agent, himself, discovers evidence of moral hazard, or of serious increase of the physical hazard, not contemplated in the original contract. In such a case, a faithful agent will not wait for instructions from the Company, but will cancel the policy at once. *A company always appreciates such care of its interests.*

After a *suspicious partial loss*, for instance, he should not even wait to have the loss adjusted before relieving the Company of any further liability under its policy. It sometimes happens that an unprincipled party, who fails in his first attempt to burn property, *has learned enough thereby to succeed in a second.*

When a holder of a policy objects to cancellation, and refuses

to surrender the policy, *a tender of the unearned premium* at the *pro rata* rate, for the unexpired time, in *legal tender currency* and *in the presence of one or more competent witnesses*, is sufficient. Care should be taken to tender the *correct amount*, and *the tender should be without any conditions, such as the signing of a receipt in full. A simple receipt for so much money paid may be demanded but not a receipt in full discharge of the claim.* When a signed receipt can be procured, it is, of course, desirable, and, in that case, should be written on the policy itself,* but it must be remembered that a receipt in full is merely an act of courtesy, not required by law, and *the legal effect of a tender is impaired where it is made a condition—a legal tender must be without conditions, such as the surrender of the policy or other document.*

It should be remembered, also, that *a check* or *national bank* notes are not legal tenders if objected to by the assured *on that ground.* United States notes, gold and silver certificates, gold coin and silver dollars are legal tender, but subsidiary silver coin is only legal tender up to the amount of ten dollars. As above stated, however, the holder of the policy must object to national bank notes or other tender on the ground that they are not money, *at the time of the tender*, to prevent its being a legal tender.

It may be well to serve a written notice as well, that the Company is no longer liable under the policy, in accordance with its own terms. (See printed conditions of the policy).

The following is a convenient form for such a notice:

Logansport, Ind., January 2, 1902.

Mr. Richard Roe,

Sir:—You will please take notice that the........... *Insurance Company of*............., *desires to terminate the insurance on your property by policy No*............., *renewal No*..........., *in accordance with its terms, and I hereby tender you the unearned or return premium for*

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*As follows: "Troy, N. Y., May 2, 1902. Received of the................ Insurance Company of New York...............Dollars, return premium, in consideration of which this policy is hereby canceled in full and surrendered to said Company." ....Assured.

the unexpired term of said policy, the Company not being responsible for any loss or damage which may occur after this date.

Respectfully,

........................*Agent.*

If no premium has been paid, the following form of notice should be served:

Logansport, Ind., January 2, 1902.

Sir:—You will please take notice that the premium of policy No........, issued by the................Insurance Company of..........., has not been paid, and said policy is null and void by its terms, the Company not being liable for any damage by fire which may occur to the property.

Respectfully,

John Doe, Agent.

To Mr. Richard Roe.

If the policy is surrendered, write "canceled" across its face and *across the entry in the register*, and forward it to the Company at once. It should not be held for the next monthly account, if canceled at the request of the Company.

Where a policy is canceled *at the request of the assured*, no return premium is due if it has less than a month to run.

Cancellation of the "Standard" Insurance Policy. It will be observed that the cancellation clause of the "Standard" policy of New York and other States differs from the old form of clause. It reads as follows (See lines 51 to 55):

"This policy shall be canceled at any time at the request of the insured; or by the company by giving five days notice of such cancellation. If this policy shall be canceled as hereinbefore provided, or become void or cease, the premium having been actually paid, the unearned portion shall be returned on surrender of this policy or last renewal, this company retaining the customary short rate; except that when this policy is canceled by this company by giving notice it shall retain only the pro rata premium."

Under the old forms of cancellation it was necessary to make a tender of the unearned or return premium, and in the case of unprincipled policy-holders this was sometimes made very difficult by their evading service. In order to secure cancellation for the company simply by serving notice, leaving the return premium to be paid upon demand, the clause in the standard

policy was framed; and it will be observed by the punctuation of the clause that this provision is a complete sentence, ending with a period, viz:

"This policy shall be canceled at any time at the request of the insured; *or by the company by giving five days notice of such cancellation.* If this policy," etc. (Note the period, capital "I" and new sentence.)

The concession of five days was considered an expensive one to make, in that it would prevent the company from being relieved of an undesirable risk for five days unless by agreement with the assured; but great as the concession was, it was considered desirable to make it in order to avoid the necessity of tendering the unearned premium.

In a recent case before the New York Court of Appeals, however, the court of highest resort in the State, it was held by the majority of the Court that, even with this clause, tender of premium or payment of it, was necessary to effect cancellation; but the minority opinion of the Court was in line with my contention that tender of return premium is not necessary to effect cancellation; and this view of the case was afterwards sustained in the United States Circuit Court of New York by Judge Wallace in the case of Schwartzchild vs. Phoenix Insurance Company "as presenting the better reasoning." I confidently believe this opinion of Judge Wallace and of the minority justices in the New York Court of Appeals will be held by other courts as in accordance with the meaning and intent of the contract. As I was one of the Commission which drew up the Standard Policy for the State of New York, I speak advisedly as to the history of this clause and the intended meaning of the phraseology, which at the time had the consideration of able lawyers consulted by the Commission. The punctuation of the clause was not presented to the Court in the N. Y. Court of Appeals case of Tisdel vs. Insurance Company, and this fact, I think, had much to do with the decision.

While I do not agree with the decision that tender of return premium is necessary, however, I think it is wise to avoid litigation by tendering the return premium wherever it is possible to do so, and to rest content with freedom from anxiety where we are prevented, by absence of the assured or evasion of service, from tendering the premium. In most cases the return of premium or tender of it, is easy of accomplishment, and it should,

for this reason, always be done. It is not necessary, of course, to wait five days if the assured will accept the return premium and sign the cancellation receipt, because both parties to the contract can terminate it by agreement at any time.

If, for any reason, the return premium cannot be paid or tendered, the cancellation notice should be sent *by registered mail* in the following form in all cases where the Standard Policy is issued:

"Dear Sir: We hereby give you notice that Policy No.................... of....................Insurance Company of..................issued to you covering on........................situated at.............................. will be canceled five days from this date in accordance with its conditions as set forth in lines 51 to 55 thereof, and we further notify you that said Company will not be liable for any loss or damage by fire to the property described in said policy after the expiration of five days as herein stated.

We enclose herewith $..................being the full amount of unearned premium on said policy for the unexpired term thereof, and we hereby request a return of said policy to the Company. Yours truly,"

And at the expiration of the five days it may be well, as a matter of courtesy to the assured and by way of further protection of the Company, to serve another notice as follows:

"Dear Sir: Pursuant to notice sent to you from this office on.............. we have this day canceled off the books of this Company, Policy No......... of the..................Ins. Co., issued to you, covering on................. situate at....... ......and all liability for loss under said policy has ceased."

If the policy is payable to a mortgagee cancellation notice should be sent to him by registered mail at the same time it is sent to the owner, using the following form:

NOTICE TO MORTGAGEE.

"Dear Sir: We hereby give you notice that Policy No.................... of....................Insurance Company, of..... ....issued to ....covering on..................situated at.................. made payable to you in case of loss, as mortgagee, will be canceled five days from this date in accordance with its conditions as set forth in lines 51 to 55 thereof, and we further notify you that said Company will not be liable for any loss or damage by fire to the property described in said policy after the expiration of five days as herein stated. If a mortgagee clause is attached to said policy the provisions of such clause relating to cancellation are to apply."

We have served a like cancellation upon the assured, above mentioned, and have paid to him the sum of $..........., being the full amount of unearned premium on said policy for the unexpired term thereof, and we hereby request a return of said policy to the Company. Yours truly,"

When a policy is to be canceled for non-payment of premium thereon, and a cancellation cannot be effected by mutual agreement and a surrender of the policy, notices should be sent in the following form by registered mail to the owner and mortgagee, if a mortgagee is named in the policy:

NON-PAYMENT OF PREMIUM.—NOTICE TO OWNER.

"Dear Sir: We hereby give you notice that Policy No.................. of.....................Insurance Company, of...... ....issued to you covering on............. ....situated at.................... ... will be canceled five days from this date in accordance with its conditions as set forth in lines 51 to 55 thereof, ON ACCOUNT OF THE NON-PAYMENT OF THE PREMIUM DUE THEREON; and we further notify you that said Company will not be liable for any loss or damage by fire to the property described in said policy after the expiration of five days as herein stated. And we hereby demand the return of said policy to this Company, together with the earned premium to this date, amounting to $......... Yours truly,

P. S. Payment of the full premium to this Company or its duly authorized agent before the expiration of the five days above mentioned, will render this notice inoperative and void; otherwise it will remain in full force and effect."

NON-PAYMENT OF PREMIUM—NOTICE TO MORTGAGEE.

"Dear Sir: We hereby give you notice that Policy No.................. of........... ......Insurance Company, of.....................issued to ....covering on................situated at.................. made payable to you in case of loss, as mortgagee, will be canceled five days from this date in accordance with its conditions as set forth in lines 51 to 55 thereof, ON ACCOUNT OF THE NON-PAYMENT OF THE PREMIUM DUE THEREON; and we further notify you that said Company will not be liable for any loss or damage by fire to the property described in said policy after the expiration of five days as herein stated. If a mortgagee clause is attached to said policy, the provisions of such clause relating to cancellation are to apply.

We have served a like cancellation notice upon the assured, and hereby request the return of said policy to this Company, together with the earned premium to this date, amounting to $........... Yours truly,

P. S. Payment of the full premium to this Company or its duly authorized agent before the expiration of the five days above mentioned, will render this notice inoperative and void; otherwise it will remain in full force and effect."

Cancellation of Policy. Claim Pending. In many cases where there is delay in the adjustment of loss which does not involve all the property described in the policy, it is important that the company should be promptly relieved of liability for further loss by cancelling the policy on the remaining property, pending ad-

justment and settlement. This should always be done where the cause of the fire is suspected incendiarism, external or internal; where the remaining property is left vacant or unprotected; or where a partial loss has occurred and the assured would be benefited by a total destruction of the property by a second fire, etc. In every case of loss where these or similar features present themselves, steps should be taken at the outset of the investigations to secure for the company a release from further liability for loss on the remaining property. Inasmuch as the conditions of the policy provide for a five days notice of cancellation which, in some cases, is notice to a claimant who has a partial loss that the second fire must take place within that period, the policy should be canceled on the unburned property at once by mutual agreement, whenever it is possible to do so, and when this cannot be done, owing to the objection of the assured or the remoteness of the mortgagee, (if policy is payable to one,) the following form of notice (enclosing the full amount of unearned premium pro rata) should be delivered by hand with a witness or, if manual tender or delivery is not possible, sent the assured by registered mail.

CLAIM PENDING—CANCELLATION NOTICE.

"Dear Sir: We hereby give you notice that Policy No.................. of....................Insurance Company, of................held by you, will be canceled five days from this date in accordance with its conditions as set forth in lines 51 to 55 thereof, and we further notify you that said Company will not be liable for any loss or damage by fire to the property described in said policy after the expiration of five days as herein stated.

You may regard this notice as without prejudice to any claim you may have upon this Company by reason of any fire which may have happened prior to this date causing loss or damage to property described in said policy, and while the said Company does not admit nor deny liability for such claim, nor admit the validity of said policy, we enclose herewith $............, being the full amount of unearned premium on said policy for the unexpired term thereof.

Yours truly,"

If the policy is payable to a mortgagee the same notice should be served upon him by registered mail, adding the words, "We have paid to the assured $............, being the full amount of the unearned premium on said policy for the unexpired term thereof."

The foregoing notices of cancellation may be made to conform to the conditions of any policy of insurance by omitting or

changing the numbers of the policy lines referred to and by changing the time in which the cancellation may be effected. All of these forms, of course, will be furnished by the Company on requisition.

When a policy has been burned, lost or mislaid, the company may be relieved of further liability at once, if the assured and mortgagee consent, (if the policy is payable to a mortgagee,) by the execution of the following receipt by all parties in interest:

In consideration of.......... ....Dollars paid me (or us) by the.. ....
Insurance Co., of New York, the receipt whereof is hereby acknowledged, Policy No..........of said company issued to me (or us,) is hereby cancelled in full from this date; it being understood and agreed that this cancellation is without prejudice to any claim which I (or we) may have for loss by reason of any fire which may have happened prior to this date to property described in said policy; and it is further understood and agreed that this cancellation shall not be construed as an admission of liability for such loss on the part of said company, nor as a recognition of the validity of said policy at the time of the occurrence of such fire, the true intent of this cancellation being to relieve said company from all liability for further loss under said policy from and after this date, without prejudice to the rights of either party so far as any pending claim for loss is concerned, and said policy having been burned, lost or mislaid, I (or we) hereby agree to protect and forever defend the said company against all persons or claims whatsoever on account of said policy by reason of any loss or damage by fire occurring to the property described in said policy from and after this date.

Dated at................this................day of................19 ...

Witness:

....

This receipt may be executed in duplicate.

The cancellation of a policy prior to an adjustment of a claim is, of course, necessary only in case of a partial loss under the policy, and in such case a question may arise as to the amount of return premium to be paid in order to effect a cancellation. When a cancellation is consented to by all parties in interest, any sum that may be agreed upon will be sufficient consideration to effect a legal cancellation of the policy. But when cancellation can only be accomplished by service of written notice upon the parties interested in the policy care must be taken to make full and ample payment of unearned premium. In such cases the safe way will be to tender or return the full premium named in the policy, and when an adjustment has been made the excess may be retained by the company upon payment of the loss. A

tender of too much return premium does no harm, while a tender of too little will defeat a cancellation. As the cancellations contemplated in this article are emergency cases care should be taken to make the tender large enough to accomplish the object sought.

Void Policies. All the foregoing pertains to the cancellation of a policy immediately after a fire, and before an adjustment has been made, in cases where there is no known breach of contract or defense. If a policy is suspended, or totally void from any cause whatever, at the time of the fire, there is, of course, nothing to cancel, and any action on the part of a company, or an adjuster, from which a desire to be relieved of liability may be inferred, *might be construed to be a recognition of the validity of the policy, and a waiver of all defenses.* Indeed the courts have held that an attempt to cancel implies the validity of the policy. This class of cases includes policies that have never attached—that is, that were void *ab initio*—policies that have been rendered void by acts of the insured, and claims for loss under an alleged parol or verbal agreement to insure. Each case will have features peculiar to itself, more or less intricate, and when encountered, the adjuster is advised to report the facts to the company for such action as may seem best after a careful consideration of any point bearing upon the question of waiver, and the possibility of a second fire resulting in an additional claim for loss, and further trouble for the company.

HOW TO PROCEED IN CASE OF FIRE.

The agent should always consider it a part of his duty to attend every fire at his agency; not only will he, in this way, gain valuable practical knowledge which will enable him to judge of the hazard of risks and exposures, but, if he is a man of intelligence and judgment, his presence and direction will, undoubtedly, be of value to his companies in the saving of property which might, otherwise, be destroyed or stolen. He will learn, also, wholesome lessons of prudence, and become more conservative and careful of his company's interest. Seeing how easily the entire receipts of an agency for years may be consumed in a few moments, he will not be inclined to accept

responsibilities for his principal for excessive amounts or inadequate rates.

Where an organized fire department exists, the agent's duties will probably be confined to the protection of property from damage by injudicious removal. The chief-engineer or superintendent of fire brigade, as before stated, should have the whole direction of a fire, and, while he may make mistakes, it is generally best that he should not be troubled during a fire with the advice of others. It is very desirable that the entire force of firemen should be under the control of one man, and the efforts of citizens should be directed rather to his removal, if inefficent, than to the confusion attendant upon a multitude of opinions, advanced at a time when only one can be followed.

Where there is no fire department, or before its arrival on the ground, the agent may render valuable service. The example and direction of a single cool and collected person, at such a time, is invaluable. At the commencement of a fire *a bucket of water, properly applied, may be worth more than a steam fire engine a few moments later.*

Do not wait for engines to come up, or disdain the simple appliances at hand. A bucket of water, an axe with which to gain access to a concealed fire, and a proper attention to the drafts and currents of air, which should be cut off, if possible, may hold the fire in check, if not extinguish it. All loud cries, unnecessary noises or excited gesticulation, tend to confusion and should be avoided. Cool, quiet and *persistent* effort is indispensable, keeping in mind that the work of extinguishing the fire may be one of hours and not of minutes, and that strength and endurance should not be exhausted in spasmodic efforts at the start, but be husbanded for what may prove a protracted and laborious task.

It is of the utmost consequence to shut, and keep closed, all doors, windows, and other openings which might, otherwise, add to the draft. There could be no better illustration of the importance of this injunction than a recent fire, that of the Windsor Hotel, in New York, on March 17, 1899. This hotel was located on Fifth Avenue, on the route of the St. Patrick's day procession, and all of the doors and windows of the hotel on the Fifth Avenue side were open. When the fire

started, therefore, the condition was that of a stove with all the dampers open, and the fire flashed so rapidly throughout the structure that it was quickly destroyed, and a number of guests lost their lives. This has always been my own theory of the cause of the rapidity of the fire, attributed by many to electric-light wiring, escaping gas, incendiarism, &c.

The person taking the lead should, by proceeding on hands and knees to avoid the smoke which is always less dense near the floor, endeavor to get as near as possible to the fire, which may often be seen burning brightly in the clear space of air near the floor, when the upper part of the room is filled with smoke. He should apply the water passed to him *so that it will strike the burning materials.* This is very important, whether the water be applied by hose from an engine or by pails. *It must strike the fire itself.*

If there is any delay in passing the water to him, and he cannot be kept supplied with pailfuls, he should use a cup or dipper to throw the water, so as to make every drop effective. So careful should he be to prevent any draft of air, that he should close the door of the room, in case he has to wait for water.

A remarkable fire which occurred at Marshall, Mich., in the drug store of Messrs. Smiley & Henderson, may be mentioned as an example of the importance of cutting off the supply of air. Spontaneous ignition took place in some fine planing mill chips which had been saturated with the drippings of linseed oil. The box containing this dangerous mixture was carelessly left on the head of a barrel containing linseed oil. The fire resulting actually charred the barrels standing near, one of which contained wine and another whiskey, and was sufficiently hot to *blister a barrel containing turpentine*, but, having exhausted the oxygen of the apartment, *it went out for want of air.* The room, though filled with the most combustible materials, was, fortunately, a closed one, there being no openings or broken panes of glass to supply the wanting element.

Where water cannot be procured, moist earth, mud or sand may, sometimes, be successfully used. Indeed, it is claimed that sand is better than water for extinguishing kerosene or other oil fires.

Where a steam jet is provided in the room in which the fire is burning, the valve should be opened, *after securely closing all the windows and doors.* If the room can be effectually closed, it will soon extinguish the fire.

If a steam jet is not provided and the room is heated by steam, or has steam-pipes passing through it, they may be broken with a heavy wrench or axe, so as to permit the steam to escape. A large mill near Philadelphia was saved in this way by the presence of mind of a passing mechanic, who broke the steam pipes with a wrench, which he happened to have in his hand while passing.

It is unnecessary to add that if fire-extinguishers are at hand, they should be used as soon as possible.

A building exposed to a burning one may, sometimes, be saved by covering the roof and exposed sides with carpets, blankets, or other woolen material, which should be kept wet by persons stationed on the roof or at windows in the upper stories with pails of water and dippers.

When it seems certain that a building cannot be saved, *and not before*, efforts should be made to save such of the contents as can be removed. It is at this stage of the fire that the utmost coolness and intelligence should prevail. The *most valuable* and portable property should be first carried out to a safe place and *guarded from thieves* who, if permitted to profit by a fire, may be tempted to become incendiaries to secure subsequent opportunities. Such merchandise as dry goods or cutlery should be removed in preference to crockery. The latter is liable to be broken even if carried out, and does not damage so easily by water or smoke as the former and yet, strangely enough, intelligent by-standers sometimes throw crockery out of the windows and carry feather beds carefully downstairs.

Furniture, mirrors and pianos, which cannot be removed without being broken in pieces and destroyed, *had better be left to burn*, that the moral effect of their wilful and unnecessary destruction may be avoided. As a rule, little, if anything, is ever saved by throwing articles out of windows, unless they are of a nature not to be easily damaged by a fall; such, for instance, as mattresses or other bedding, wearing apparel, etc.

In case a barn or stable is on fire, the horses and cattle should

be at once removed. The building is, frequently, even as a question of value, of less importance. In removing animals care should be taken to do so, as nearly as possible, in the ordinary manner, without excitement, or unnecessary noise, which might frighten them. If they become restive they should be blindfolded with a coat, empty grain bag, or other cloth, care being taken to keep the eyes thoroughly covered until they are safely removed to some secure place *where they cannot see the fire.* Animals will, sometimes, rush into a burning building, if not prevented, *especially if it be the one in which they have been fed or sheltered*—not because they love to rush into fire, as is erroneously supposed, but because they become frightened.

Merchandise on the lower floors may often be saved from serious water damage by covering counters, tables, and shelves with tarpaulins or canvas. The covers should extend well over the tops of shelves, in such cases.

Chimney Fires may be almost instantly extinguished by throwing salt on the fire. The process of burning the salt evolves muriatic acid gas which extinguishes flame.*

Where sulphur is procurable it should be thrown into the fire and the fire-place covered with a metallic fire-board or "blower." Sulphurous oxide, resulting from the combustion, will soon fill the chimney, and taking up all the oxygen from the contained air, will extinguish the fire. A fire may be extinguished, in this way, even after it has extended into the wood-work of a building.

Where a person is exposed to the flames or smoke of a burning building, he should breathe through a wet cloth or handkerchief, or the lapel of his coat, previously wetting it for the purpose. I cannot offer better advice to one in a burning building than that of ex-Chief Hugh Bonner, of the New York Fire Department after the burning of the Windsor Hotel already referred to. It is as follows:

"Should the cry of 'Fire!' resound throughout the hotel and volumes of smoke fill the corridors and the room, the thing above all others to do is to keep cool. Keep cool, keep cool, keep cool—no matter how serious the fire

*Muriatic acid is a hydric chloride, and as common salt is a sodic chloride containing, also, more or less moisture by absorption and, therefore, hydrogen, its combustion would generate hydric chloride, or muriatic acid gas.

seems, is the advice that I reiterate. If those who jumped from the windows of the Windsor had kept cool and waited for the firemen, instead of jumping, most of them would have been saved.

When smoke clogs the corridors, follow these suggestions:

1 Keep the door and transom of the room shut.

2. Open the windows from the top.

3. Wet a towel and stuff it in the mouth. Breathe through it instead of through the nose. It will keep the smoke, cinders and fire from the lungs, and its moisture will have a reviving effect.

4. Stand at the window and get the benefit of the outside air.

5. Should there be a rope fire-escape, use it only when you deem it necessary for your safety. If it is secured, as many of them are, merely by an iron hook, twist it several times around some solid article in the room. Then begin your descent. It is a dangerous experiment at best and there is only one safe way of doing it. That way is this: Protect the hands by covering them with towels or anything of like nature; grasp the rope firmly by both hands, twist it once around the right leg, then placing it between the feet keep them firmly together and in that position slide down the rope as slowly as possible.

A woman should go down the rope in the same way. In the average case her clothes will permit her to make an easier descent than a man.

6. If possible, never let a woman or child descend on a rope alone. The husband should secure the rope under his wife's arms, place some article of furniture higher than the window sill near the window, and then let the woman descend by paying out the rope gradually. If the child is small, it is well to tie it with bedclothing to the breast or back of th person going down the rope.

7. Never jump unless the blaze is scorching, and not then if the firemen with their scaling ladders are coming up the building or are near.

8. Never go to the roof when you know that there is no escape from it to adjoining buildings unless as a last recourse. In the big buildings fire always climbs to the top.

9. If caught in a corridor or a room, always keep crouched to the floor and keep close to the wall. Keep as low as possible. Fire and smoke ascend.

10. If a jump must be made through flame within a building to the lower floor, judge the distance as carefully as possible, throw a blanket or covering over the head and make the leap. Then remove the covering, breathe but little and carefully and work gradually along the corridor until safety is reached.

Theoretically I know of no other instructions. The most important feature is to be prepared for an emergency, and the only way to obtain that preparation is by a preliminary examination. When one has made that examination he knows when the emergency arises what is his best method of procedure.

What I have said may seem elementary, but I speak from long and active experience, and I know that the instructions are accurate. When I say 'keep cool' it is with the knowledge that New York's firemen will do their duty. There's not a coward in the department. The tests in our school of instruction

are so perilous and severe that none but a brave man will undertake them. The Commissioners never have to reject a 'probationer.' The candidate for membership in the department rejects himself usually at the end of a week, if he hasn't courage. Capt. McAdam is the instructor of the school and drill-master of the Life-Saving Corps, and the fireman who has taken a thirty-day course in his school is competent to save life and do heroic deeds. When the men in blue are in sight don't jump. They'll climb walls and go through smoke and fire. Their mission is to save life, and they'd rather die themselves than fail in their duty. If by any possibility they can't reach a window or a roof they'll spread the life-net at the base and be ready to receive the jumper. My final instructions are: Study the surroundings of your room and building, know the methods of escape, keep cool and—don't jump."

The Chief adds advice, which probably every underwriter always follows, as to what should be done in a hotel before a fire, namely:

"The first thing a hotel guest should do on being assigned to his room is to locate the nearest outside fire-escape. After that he should familiarize himself with the location of the hall windows and discover their relation to the roof of the adjoining buildings. He should next learn the position of the stairs and their top and bottom landings. The top landing particularly he should know all about, as well as the method of egress to the roof. All this information the guest can acquire in ten minutes or less. After making these investigations, should a fire break out, he knows his relative location and his various avenues of escape.

Precisely the same rules apply to private houses and flat buildings, especially in cities, where private dwellings are frequently five stories high."

HOW TO PROCEED IN CASE OF LOSS.

If any portion of the property is saved, take immediate steps to have it protected by the assured from further damage, and then notify the Company, at its office, by letter or telegram, according to circumstances. If the loss is a severe one, a telegram should be sent giving *number of policy*, *probable percentage of loss*, and *names and amounts of other companies on the risk*, that the Company may consult with them as to the action to be taken. The telegram should be immediately followed by a letter, giving all the particulars that can be collected.

Avoid unnecessary words in a telegram, such, for instance, as "*send adjuster*," or "*what shall I do?*" Requests for instructions are unnecessary. It must be obvious, on reflection, to an intelligent agent, that the Company would naturally advise,

upon receipt of the information, without being reminded of its duty.

The following form of telegram may be modified to suit cases:

.. .. *Insurance Company,*

....

"*Total loss* (or fifty per cent., or otherwise, as the case may be), *twenty-four twenty-two, James Brown; Home, five thousand; Aetna, five; Phenix, Brooklyn, ten.*"

Richard Roe, Agent.

This gives the Company all of the principal facts necessary to enable it to consult, as to the adjustment, with the other companies interested.

Where a greater number of companies are on the risk, they may be grouped according to amounts, to save words and expense, thus: "*Home, Aetna, Hanover, five thousand; Niagara, National, three; Hartford, Germania, twenty-five hundred.*" This will be important and intelligible information. As a rule, however, it is entirely unnecessary to wire the names of the companies, *especially if the agent has properly filled out the daily report as to the other companies insuring the risk.* Moreover, where the company has a special agent to adjust the loss (as most large companies have) the information as to other companies is not necessary and the expense of wiring it should be saved.

When the loss is small and no immediate action is necessary, dispatch a letter, as soon as possible, but do not telegraph. It is more important to telegraph, in case of a *serious partial damage to a stock of merchandise*, than where the loss is on a *building*, as an experienced adjuster, if promptly on the ground, may possibly save a serious damage from rust, mildew, or other cause.

Hardware, and especially cutlery, should be unwrapped, well rubbed off and oiled, as soon as possible. Dry goods, rolls of cloth, clothing, etc., should be opened out to dry to prevent further loss by heating, stains and mildew. Such goods should never be piled up while damp. Tobacco, stationery, drugs and stoves all need immediate care. The agent, in such cases, should act with decision, and especially if the assured is un-

principled enough to object to such precautions, the agent should notify him that it is his duty, under the contract, to take care of the damaged property, and that the underwriters will not be responsible for the consequences of any neglect on his part. Lines 67, 68 and 69 of the Standard policy are as follows:

"If fire occur the insured shall give immediate notice of any loss thereby in writing to this company, protect the property from further damage, forthwith separate the damaged and undamaged personal property, put it in the best possible order, make a complete inventory of the same, stating the quantity and cost of each article and the amount claimed thereon."

The agent should have supervision of the damaged property, but it is best to arrange the matter of caring for it amicably with the assured, convincing him that it is to his interest. A little tact at this point would be valuable, and an intelligent agent will soon convince any ordinary claimant that he is simply advising him in his own best interest.

Where the building is insured and is partially damaged, it may be necessary to temporarily close the roof or a broken side wall, with cheap boards, to prevent farther damage by rains. Walls, also, may need shoring or propping to prevent their being blown down.

Some persons suppose that they must not touch anything, after a fire, until the underwriters have examined the premises. They should be instructed that *it is their duty always to protect the property from further damage.*

When the circumstances of a partial loss are so suspicious as to indicate incendiarism on the part of the assured, it may be advisable to cancel the policy, (see *ante*, pp. 313, 318), or to employ a constant and reliable night watchman, to keep the property under constant surveillance, until the adjustment is consummated and the policy can be taken up, in the regular manner. Those who fail in a first attempt to burn property *sometimes succeed in a second.*

Collecting the Facts of the Fire. Having taken every precaution to save further loss, the agent should endeavor to ascertain the cause of the fire, if possible, whether originating from design, carelessness, spontaneous combustion, or other causes. He should ascertain whether there were any suspicious circumstances before, or at the time of the fire, and to succeed, it will be necessary to proceed quietly and cautiously. Parties know-

ing of suspicious facts are generally slow to communicate their knowledge or suspicions. Always try to find the *person who was first upon the ground and ascertain what he saw*, and at what hour of the day or night the fire was discovered.

Find out whether the building was *occupied or was standing vacant* at the time of the fire, and if vacant, how long it had been so; whether it was a paying investment to the owner and *lessee*; whether it was "for sale," (and if so, for what price), or in litigation; whether mortgaged or about to be; if mortgaged, whether undergoing foreclosure, or whether the mortgage had been called in; whether any threats had been made to burn the property, etc.

If the loss is on merchandise, ascertain whether the stock was full or low, new, or old and shelf-worn; whether the *books of accounts and papers were saved*; whether any property was stolen, at or after the fire, and if so, how much—giving a detailed statement.

Not a small portion of jewelry stocks is, sometimes, in the *trunks of traveling salesmen*, though included in the inventory of the store; and, in the case of country stores, no inconsiderable portion of the merchandise may be, at the time of the fire, *in the wagons of peddlers* traveling through the country and selling for account of the assured. Make careful investigation as to such important facts, and quietly reserve them for the final settlement.

Ascertain whether the assured was ever burned out before, and if so, *when* and *where*; *whether insured at the time*, and if so, in what companies.

It is, sometimes, well to examine, also, as to the habits of *book-keepers, clerks or other employees.*

Upon an examination of the premises after a suspicious fire, the *agent should carefully write out an accurate, detailed description of the appearance of the premises.* If a stock of merchandise is partially damaged, he should note the number of shelves totally destroyed, the number partially destroyed, and whether they were full or only partially full of goods; the appearance of counters, whether any goods were piled on them, and to what height; the character of the goods—whether cheap or expensive; the quantity and appearance of the *debris*—some

kinds of merchandise leave traces. Axes and hammers are never destroyed, pails leave hoops, etc. He should not trust to his memory.

Under no circumstances should the agent make any alteration in the policy, or consent to any transfer or assignment of it, or to any change whatever, after a loss. He should let everything remain in precisely the same condition as at the time of the fire.

Adjustment of the Loss. *The agent should not proceed with the adjustment of the loss until instructed by the Company, unless the circumstances are such as to make further loss certain, for want of immediate action, as in the case of a damaged roof exposing a building to the weather.* Up to the receipt of such instructions, the agent should employ himself merely in protecting the property, and in gathering all the information he can as to the cause of the fire and particulars of the loss.

Partial Losses on buildings should be adjusted by appraisement in exceptional cases only. Estimates should be obtained from two or more responsible builders as to the amount for which each will repair the damage *to the satisfaction of the assured.* Blank estimates will be sent by the Company. The amount of the lowest *responsible* estimate may be offered by the Company to the assured, as he may prefer to do the work himself, or may desire alterations in the plans. In case, however, the Company elects to repair a contract should be drawn (blanks for which will be furnished by the Company) for the builder to sign, in which he agrees to restore the property to the same condition, in all respects, as it was in before the fire, the Company agreeing to pay him the amount of his bid so soon as the repairs are completed and he produces a certificate from the assured that he is satisfied with the manner in which the repairs have been made.

Do not deal with unprincipled or irresponsible builders, who cannot be relied upon to carry out their proposals to the letter. The estimates of such builders, if entertained, might work great injustice to the assured, *especially if he should elect to receive the amount of a reckless bid instead of having the property repaired by the Company.*

When the building is totally destroyed, it may be necessary, in

case of a disagreement as to its value, to resort to an appraisal and to require the owner to produce the original plans and specifications upon which it was constructed, on which estimates may be obtained to rebuild; or to furnish other satisfactory evidence to the Company as to the original cost of the building, unless the loss is manifestly greatly in excess of the insurance. As a rule the cost of replacing a building with another of like quality and construction, *less a proper depreciation for a difference between new and old*, is the measure of damage. In estimating depreciation the age, condition, location and adaptability of the building to the use to which it is applied, should be considered. Depreciation is an element which enters into the adjustment of nearly all losses on buildings, and in view of the difference of opinion which is likely to arise on this subject an appraisal is frequently necessary to determine the question, and in such cases the appraisers estimate the cost of rebuilding, allowing a proper deduction therefrom for depreciation to arrive at the cash value of the structure at the time of the fire.

When personal or movable property is damaged, the assured as already stated and in accordance with lines 67, 68 and 69 of the Standard Fire Insurance Policy, must forthwith cause it to be put in order, assorting and arranging the various articles according to their kinds, separating the damaged from the undamaged, and cause an inventory to be made and furnished to the Company of the whole, naming the quantity, quality and cost of each article at the time of the fire, as well as the actual damage each article has sustained by the fire. See the conditions of the policy.

In case of the total destruction of movable property, and when it is not possible for the assured to furnish schedules of the whole, a schedule of all that can be ascertained should be given, and such evidence furnished as to the balance of the property as shall be satisfactory.

The damaged property *belongs to the assured, he cannot abandon it.* Abandonment is not a feature of fire insurance, which is strictly a contract of indemnity only.

Selection of Appraisers. *As before stated, losses on buildings should not be submitted to appraisement until all other*

proper methods of adjustments have failed. When an agreement, as to the value of *personal* property, cannot be arrived at, it may be advisable for each party—the assured and the agent—to select a *disinterested intelligent appraiser*, submitting the question of damage to the two so selected by a *written agreement.* The two appraisers may together choose a third, in case they cannot agree; and the award, in writing, of any two should be binding, *as to the value of the property and the damage.*

Appraisement, however, should be a *last resort*, and not taken (except in the case of property which will damage by delay, as hereinafter explained) *until orders are received from the Company.* It will generally be found that a reasonable, intelligent and honest claimant and a conscientious adjuster can agree, without difficulty, upon a fair settlement. Appraisers sometimes lean unfairly toward the interest of a claimant, and yet *quite often do him great injustice.*

The appraisers *must examine each article*, and state, in detail, the sound, *wholesale cash value* of it at the time of the fire, as well as the actual amount of the damage. As each item is arrived at, it should be entered clearly, in ink, on an inventory prepared with double columns for "sound value" and "amount of damage."

The duties of the appraisers end with their award as to the two items of "sound value" and "damage."

They have nothing whatever to do with the liability of the Company, or with such items as cost of removing property, of watching and caring for it, the amount of profit, loss of time or rents, or disarrangement of business, etc., and they must not bring these matters into their award, either directly or indirectly; nor is an appraisement the proper place for the consideration of such claims as for the value of blankets, carpets or other appliances used in protecting the property.

Appraisers *are not arbitrators.* They are not to say how much the Company is to pay, or to treat of or *mention* its liability in any way. They have simply to deal with the *sound value and damage of the property before them.* The appraisement and award must be *under oath and in writing.* (For form, see index).

The Company will furnish blanks for appraisal.

The *expenses of appraisal* are to be divided equally between the Company and the assured, *each paying one-half*.

The Company reserves (but seldom avails itself of) the right under its policy to take any or all of the appraised property at its appraised value. This reservation is necessary to enable it to protect itself from a careless, ignorant or intentionally excessive and unjust estimate of damage by the appraisers.

Upon such property as will damage by delay. such as stocks of fruits, confectionery, cutlery, etc., an *appraisal should be immediately had*; delay increases the damage, and the property can be best cared for by the owner, when his is the sole interest. *Agents are, therefore, authorized, in such cases, to insist upon an immediate appraisal*, unless they can agree with the owner as to the amount of damage. By prompt action, in such cases, the responsibility of caring for perishable goods will rest upon the owner, who, by reason of experience and acquaintance with them, is better qualified to take the steps necessary to prevent subsequent damage. In all other cases, however, the agent should wait for instructions from the Company before consenting to an appraisal.

Do not close an adjustment or admit any liability under any circumstances, or consent to the representation of this Company *by the adjuster of another Company, unless instructed to do so.* Upon the arrival of the adjuster of another company, however, *telegraph the fact to the Company*, as follows:

......................*Insurance Company*,

....

"*John Jones, Aetna adjuster, here adjusting their loss.*"

It may happen that the Company, knowing such adjuster, by reputation, to be competent and honorable, may be willing to entrust its interests to his care, and be glad to save the expense of sending its own adjuster.

Where a claimant seems in undue haste to have his loss settled, it may be advisable to wait. *Suspicious losses do not suffer by delay.* Be sure to select honest appraisers—those who will do justice by the assured not less than by the company. A competent, experienced adjuster will, in most cases, handle

a claim on personal property, stocks of merchandise, &c., without having an appraisal. This is generally possible where the claimant is an honest man and the adjuster understands his business.

In one case coming to the writer's notice, one of the most capable and tactful adjusters in New York* proceeded to a store to settle a claim of $800 on a stock of boots and shoes. A hasty glance convinced him that the assured was honestly mistaken in his estimate of the damage, and when he insisted upon an appraisal and asked the adjuster "Whom would you select?" the adjuster said:

"I prefer you as an appraiser. From all I hear, you are an honest man, and I am sure you understand the value of your own goods better than anyone else; suppose you and I first try to arrive at the amount of the loss without calling anybody else in. I will take a pencil and paper, and you examine each box of boots and shoes and tell me what you think the loss is."

The assured assented, and the two proceeded in this way carefully and fairly, until all the damaged goods had been "appraised" at the figure the assured himself had named as the measure of damage. Before footing the columns of items, the adjuster said:

"Now, is there anything else? We want to be sure you have got everything."

"You have everything," was the reply.

When the sum total was ascertained it was less than $150, and the merchant expressed himself as perfectly satisfied.

Adjusters of this calibre make handsome salvages, and satisfy the claimants, while there is a class of adjusters who could not adjust and pay a total loss without leaving the claimant angry.

I cannot better describe the methods of an intelligent adjuster than by employing the language of Mr. R. J. Taylor, as follows:

"An extravagant claim is not always evidence of dishonest motive on the part of the claimant. It is human nature to value one's own possessions more highly than those of another. The property burned, by reason of associations, may have a sentimental value in the estimation of the claimant largely in excess of its actual value. Of course, the contract of insurance contemplates only the 'actual cash value' at the time of the fire; yet, notwithstanding this fact, it is not the part of the wisdom to rudely disregard the sentimental view of a loss by a waive of the hand, and bring the claimant down at one fell

*The late Mr. Charles C. Halsey.

swoop to a contemplation of his loss on the proper basis of 'cash cost of replacing, less depreciation.' It should be the aim of an adjuster to lead a claimant to the acceptance of a proper adjustment by patient explanations; by good-tempered argument; by convincing him of the integrity of your motives; thus securing his confidence, by giving him a fair and courteous hearing on all points of difference that may arise, remembering always that while an adjustment is a matter of every-day occurrence to an adjuster, a fire may be the great event in the lifetime of the claimant. To him the adjustment is everything. It is not strange, therefore, that honest claimants should be nervous, exacting, unreasonable and suspicious of the acts of adjusters. Their minds may have been filled with all manner of suspicions, and an unreasonable claim may have been inspired by officious busybodies who attend to everybody's business but their own. The proper treatment of a claimant is fully as important in an adjustment as the capacity to fully and clearly estimate the amount of loss. No matter how accurately a claim may be adjusted, the adjuster's labor will be in vain if he fails to convince the claimant of the correctness of his figures; and he certainly will not be able to do this, where there is any controversy, unless he has by fair dealing and courteous demeanor secured the confidence and good-will of the claimant.

The practical adjuster will not see in the foregoing remarks a justification of careless or loose adjustments, nor for the display of weak vertebrae on his part. On the contrary, he must combine *firmness* with courtesy. He must be able to say NO and to stick to it when necessary. The point of the argument is that, while it is the duty of the adjuster to adjust every loss assigned to him carefully and thoroughly, he should at the same time treat the claimant in such a manner as to secure his acquiescence in the adjustment without losing his friendship for the company."

"It is admitted," Mr. Taylor continues, "that there are claimants whom nobody can please—claimants who take offence if the slightest demand is made on them for data and information relating to the loss—claimants who are ignorant of their rights and stubborn because of their ignorance—claimants who are offensive, unreasonable and dishonest—but even in such cases it is only the adjuster who combines courtesy and tact with *firmness* who has any show at all of securing a proper adjustment. The hot-headed and sarcastic adjuster is usually compelled to retire from the case, and every such occurrence strengthens the contention of the claimant and correspondingly weakens that of the adjuster.

'A soft answer turneth away wrath.'"

Such advice from an adjuster who has spent a lifetime in the business may well be followed by one who has an honest desire to learn. Experience is the best of teachers, and it is less expensive, when the experience is that of others.

Damage by Removal. Where goods are damaged *by removal*, the loss and expenses of removal are borne by the assured and the insurance companies together, *in proportion as each is interested.* If the insurance companies have insurance upon

the property to its full value, they pay the whole cost of removal, but if to the extent of one-half its value, they pay one-half of the damage and the expenses of removal, and the assured pays the other half. This must impress any one as an equitable apportionment. As the removal, in such a case, is made more in the interest of the assured than of the companies, he should bear, at least, an equal share of the expense and damage, for all of the goods saved are his, unless he saves more than the uninsured portion.

Damage by Explosion. Such damage is not a loss within a fire insurance policy and is expressly excepted by its terms, as follows:

"This company shall not be liable for loss caused directly or indirectly by invasion, insurrection, riot, civil war or commotion, or military or usurped power, or by order of any civil authority; or by theft; or by neglect of the insured to use all reasonable means to save and preserve the property at and after a fire or when the property is endangered by fire in neighboring premises; or (unless fire ensues, and, in that event, for the damage by fire only) by explosion of any kind."

Damage by Lightning is not covered by the policy unless expressly mentioned in writing. (For form of clause see index).

When the agent is convinced that there is no fraud on the part of the assured and that his claim is an honest one, he should place himself on an amicable footing with him, *and assist him as much as possible.* Honest claimants should have every facility and assistance afforded them. Assure them, at the outset, that *the Company desires to do them full justice*, to pay—not one dollar more than they have lost—*not one cent less.* An insurance company does not want so-called "jump" adjustments, where, the assured making a round claim, like the $800 boot and shoe claim just referred to, is offered $400 by a lazy and incompetent adjuster as a settlement, without going into the matter. In the case cited the company would have lost more than half of the adjuster's offer. On the other hand, the assured in some cases will not receive all that he is entitled to. It is safe to say that a jump adjustment does injustice either to the company or to the claimant, and adjusters of this class should be railroaded out of the business. They have no proper place in it.

When it comes to guessing, the assured, with that better

knowledge of his property which every claimant possesses, can beat the adjuster guessing every time.

Such slovenly methods increase the sum total of losses and, therefore, the fire cost and premium tax upon that large majority of property-owners (more than 95%) who have no fires. As insurance simply distributes the losses on the unburned policy-holders, it is a gross injustice to them to pay more than the actual damage. It is safe to say that with the best of intentions on the part of honest claimants and careful, fair-minded adjusters, more is paid for losses than the actual measure of them, so that neither the company nor its policy-holders can afford to have careless adjustments. If the fire losses paid by the insurance companies for the last two years were only ten per cent in excess of the actual measure of them, the amount would have been more than double the percentage of profit on the earned premiums of the most successful companies in the business.

It is safe to assume that three-fourths of all the adverse legislation and of all the adverse judicial decisions recorded against insurance companies, and rising, like Banquo's ghost, to confront us at every point where vicious claims are contested, have been placed upon the statute books because of sharp and unprincipled adjustments made by men who are unscrupulous enough to cheat claimants and foolish enough afterwards to boast in public.

In one case coming to the writer's attention, two adjusters, seated at a hotel table, entertained each other with highly colored, boastful stories as to adjustments they had made with honest claimants, in the hearing of two members of the legislature, as to whose identity they were ignorant. Is it any wonder that a valued policy law would get the votes of men who had listened to such a conversation? No reputable insurance company desires an honest claimant to get a cent less than he has lost.

A safe rule, given by the father of one of New York's ablest and most successful millionaires, in starting out in life was:

"John, don't ever be more than half as sharp as you know how to be."

We cannot amplify on this pithy advice.

The great aim of every adjuster should be to assist an honest claimant in ascertaining his actual loss; and, on the other hand, to ferret out a dishonest claimant and bring the incendiary to proper punishment, securing his indictment through the Grand Jury. (We never want a man arrested under any circumstances, except by the authorities after indictment by the Grand Jury, before whom the underwriter knowing the facts should appear.) This would save any suit for damages for false imprisonment in case a charge could not be proven, or an informant should be found untruthful, as is sometimes the case.

The agent must not forget, however, that scrutiny and investigation are never objectionable to honest claimants; indeed, they generally court the most rigid investigation. We have frequently discovered great errors in the books of account and recollections of honest claimants, who have been most ready to admit these errors when brought to their notice. Blanks for proofs of loss are sent by the Company, to facilitate the collection of losses by honest claimants. Dishonest claimants should be left to prepare their proofs, without any suggestions, assistance or blanks furnished by the agent. Direct the assured, in such cases, to make his proofs in accordance with the conditions of the policy, in which full and explicit directions are given.

Payment of Losses. Never draw drafts upon the Company for the payment of losses *until authorized by the Company to do so*, and then only on the form of blank draft, with receipt attached, (the draft and receipt must not be separated), forwarded for the purpose by the Company. *The Company always sends blank drafts and instructions.*

It is the experience of the companies generally that those claimants who, immediately after a loss, consult a lawyer and place themselves in his hands, are generally conscious that their claims need external assistance, and such losses should receive the most rigid scrutiny. Under no circumstances should such claims be paid before the expiration of the sixty days from the filing of proofs.

Hasty Payments should be avoided. When a case of unusual hardship would seem to require speedy relief, and the Company, in view of all the circumstances, orders the amount paid, *do*

not advertise the fact in the newspapers. Such advertisements are always followed by applications for insurance on the part of an unprincipled class whose patronage we desire to avoid. *They misconstrue the motive of the payment*, and, supposing that the Company is seeking a reputation for so-called "prompt payments," without proper investigation, *they often aid in increasing its opportunities for advertising.*

The practice of making hasty payments of losses is not calculated to commend a company to an intelligent and desirable class of customers.

Discounting Claims before Maturity. In those cases where the justice of the claim is unquestionable and all the circumstances of the fire satisfactory, and the assured desires to use the money, before it is due, for the purpose of his business or to replace the burned property, the Company will allow payment requiring, o' course, a deduction for interest, that it may not lose by disturbing its investments.

Payments in advance of maturity, however, should be made with care. There are many claims which should wait the sixty days. In the case of a claimant in the Northwest, where one of our adjusters paid a man whom he had personally known for many years a claim, discounting it in advance of maturity, he received, after making the payment, an anonymous communication telling him where he could find all the doors, blinds and movable portions of the building which he had just paid for, concealed under a hay stack on the premises of the assured. Nothing was left to him but to commence an action in court to recover the money; but the accused escaped on a technicality as to the form of the loss draft and the papers served in the case, and the adjuster was left with the consolation that he had learned two important lessons: first, that a man might be mistaken, after long acquaintance, in the character of his friend; and, second, that the sixty-day payment clause in a policy is a wise provision.

In the commercial world thirty days is regarded as cash, and few lines of goods are paid for within sixty days; so that even in the case of a merchant who wishes to replenish his stock it is not always necessary that he should pay cash; and if the loss be on a building, the money is not needed tor rebuilding, except in

installments. So that the cases where proper consideration of the immediate needs of a claimant is involved are not necessarily numerous.

Those companies who pay losses before the smoke of a fire has blown away, often make discoveries, in a clearer atmosphere, which are not apparent at the time, and find out their mistake when it is too late to remedy it.

When a Loss is paid, cancel the Policy, taking a receipt for the amount of the loss and of the return premium, if any, on the face of the policy. *Do this whether the loss is less than the amount of the policy or not.*

In those cases where it is necessary and desirable to continue the insurance, it should be done *by a new policy.*

Waiver. Finally, there are some things that the agent must certainly not do. He must not waive any of the provisions of the policy, or the rights of the company; and to avoid this mistake, he must not do, say or write anything that will have this effect.

He must not deny liability, leaving that task, if it is necessary to take such action, to the company. Even where he has reason to suspect fraud, he should not let the claimant infer that the company is not liable. If convinced that the claimant is dishonest, he should say "The company does not admit nor deny liability in the matter of your claim; your policy tells you what to do in case of loss; you must govern yourself by its conditions and requirements." In such cases he should avoid such statements as "I will see you again," or "You will hear from me later," or words of like tenor. The policy-holder might claim that he had acted on the suggestion as an explanation of not doing all that he was required to do.

If the papers submitted as proofs of loss are insufficient, he should let the company decide the matter and write the necessary notice to that effect.

It is probably unnecessary to suggest to any intelligent man that no threats or intimidations should be used under any circumstances. It ought also to be unnecessary to say that the agent should not take any steps to adjust a loss (other than that of protecting the property especially an unroofed or open building from the weather, damageable goods from further injury

by rust, mildew or otherwise) until he hears from the company. Most agency companies have special agents and adjusters for each State, who will promptly respond to any message from the local agent.

THE GOOD FAITH OF INSURANCE CONTRACTS.

No contracts known to the commercial world are so generally lived up to, without quibbling or evasion, as are Insurance policy contracts *on the part of the companies making them.* Owing to the neglect and carelessness of the insured, there is none which might be so easily and frequently avoided, on technical grounds, notwithstanding which they are generally (always, by honorable companies) fulfilled to the very spirit of their terms, whenever fraud is not manifest on the part of the policy-holder.

In ordinary business transactions, if the endorser of a note is not informed of its protest, through the inadvertence or ignorance of the holder, he rarely, if ever, fails to take advantage of a release which the law gives him on merely technical grounds, *notwithstanding that he may not be, in any way, a sufferer by reason of such want of notice and, notwithstanding, that the moral obligation of suretyship remains unimpaired.* Not so with the underwriter. Every month in the year he pays claims, without litigation, which he might avoid on the most clearly settled principles of law—claims for many times the amount of ordinary business transactions, and which, if appealed to the courts, could not be enforced; and yet when, in consequence of some flagrant and inexcusable disregard of right, a liberal sum is offered by way of compromise settlement of what is really no legal claim whatever, the Company is assailed with unjust criticisms, and with the cry of unfair treatment—raised, it is true, most loudly by those who are anxious to coerce the payment of unjust demands and for their own selfish purposes, but—too often for their own real advantage—finding an echo in the sympathies of many who are content to sit in judgment, without taking that trouble, which simple justice requires, of examining into the merits of the case.

It is far from uncommon to hear those complain of printed

conditions in a policy *who are too indolent to read them*, and who are, probably, not aware of the fact that if the conditions of the policy, instead of being plainly printed on its face, for their information, were left to be inferred by the law (which is very jealous in guarding the rights of that party to a contract who relies entirely upon the honor and good faith of the other), the interest of the underwriter would, in many cases, be still better protected than now. The moment a company defines the conditions of its policy, it becomes responsible for omissions, and places itself under the well-known rule of construction, by which a contract is held to permit much that is not expressly prohibited.

"If he who could and ought to have explained himself clearly and plainly has not done it, it is worse for him; he cannot be allowed to introduce subsequent restrictions which he has not expressed."—Vattel's "*Law of Nations*," *Book ii, Chap. xvii.*

It may, therefore, indeed be questioned, whether, in the attempt to place clearly before the assured, in the policy, the conditions upon which it is based, the underwriter does not lose many advantages which a blank contract would secure before a court of law, by the mere inference and operation of the law itself.

With a policy *entirely free from conditions of any kind*, for instance, a company would be protected by conditions which are *implied by law*. Under such a contract it would be secured, not less thoroughly than now, against the unreasonable claim of one, for example, who should change the occupation of a building, insured as a dwelling house, into that of a planing mill, without its consent. In such a case, it would simply be necessary for the company to say: "*Into this contract we never entered.* We insured a dwelling, but it has been changed to a more dangerous risk, for which we would have charged a higher rate." It would require no policy condition to protect the company from the consequences of such an increase of the hazard, and when it calls the attention of the assured to the fact that any increase of the hazard will vitiate the policy, by clearly printing the statement on the face of the contract, it does so gratuitously, and in a spirit of fairness which is not always appreciated.

The right of a landlord to be consulted as to any change in

the uses or occupation of his property by a tenant is universally recognized; and it should be remembered that the contingent interest of an underwriter in an insured building is frequently measured by no smaller sum than its full value.

The following extracts from the decisions of eminent jurists show clearly that no policy condition is necessary to protect an insurance company against those who are dishonorable enough to conceal important and material facts, or who procure their insurance by misrepresentation or fraud.

Angell says:

"In every sort of insurance, whether Fire, Life or Marine, it is held to be one of the plainest principles of equity, that a contract, which one party *has been induced to enter into from his ignorance of the thing concealed, shall not be enforced against him by the other who has concealed it.*"

Lord Mansfield said:

"Good faith forbids either party, by concealing what he privately knows, to draw the other into a bargain, from his ignorance of that fact and his believing the contrary."

Chief-Justice Marshall said:

"The contract of insurance is one in which the underwriters generally act upon the representation of the assured, and that representation ought, consequently, to be fair, and to omit nothing which is material for the underwriter to know."

Judge Story said:

"In such cases, the underwriter necessarily reposes a trust and confidence in the assured, as to all the facts and circumstances affecting the risk, which are peculiarly within his knowledge, and which are not of a public and general nature, or which the insured knows or is bound to know."

Chief-Justice Gibson said:

"The contract of insurance is eminently *a contract of good faith.* It is not sufficient for the insured to answer all the questions propounded to him. *Like a witness on the stand, he is bound to tell the whole truth,* without waiting to be interrogated."

As before stated, it is in a spirit of fairness, and that the policy-holder may be informed for his own safety, that companies print clearly in their policies, even those important conditions which would be inferred by law from the very spirit of the contract; and the business man who places a policy in his office safe, without once reading it through, has only himself to blame if he suffers the consequences of a negligence, *which he would not exhibit as to the most insignificant of other*

business papers. Says an able writer on Commercial Law: "A majority of well-trained and careful business men, who have large amounts at the risk of fire, and whose indemnity depends upon the policies of insurance which they hold, and upon their conforming to the terms and conditions thereof, *never read the entire contents of a single policy of insurance held by them*, or examine the conditions and requirements thereof, with a view to ascertain whether they are conforming thereto. It is not an unusual thing for a man, the main bulk of whose property has just been destroyed by fire, *to get out from his safe and read, for the first time, his contracts of indemnity!*" And he adds, with much truth, "*The business of insurance is, fortunately for the business community, mainly managed and controlled by men whose high character and usually clear sense of equity prevent them from availing themselves of immaterial or technical objections, except in cases where they believe there has been fraud.*"

A glance at the small proportion of losses contested by companies will establish the truth of this statement.

At the close of the year 1901, the reports of the companies showed that *a sum not equal to two per cent. of the amount of losses paid by them during that year were in suit at its close;* and as those losses in suit were the result of an average of, at least, three years' business, it follows that *the losses contested are less than one per cent. of the whole amount of losses incurred!*

When it is remembered how many fraudulent claims are made upon underwriters, it becomes a serious question—not whether too many claims are contested by them—but *whether enough are resisted to protect the interests and ensure the security of their more honest claimants!*

EXPOSURES TO BRICK BUILDINGS.

One of the most important and difficult problems connected with estimating the proper rate of a building is that of measuring the effect upon it of other exposing risks. The following tables were computed by me for estimating this hazard, while at work as chairman of the Universal Schedule Committee. I have already treated of this subject in a general manner on pages 62 to 72, but the rules and tables for computing the cost of an exposure which follow will, I believe, commend themselves as based upon correct assumptions of hazard. They can be used for any system of rating, whether the "Universal" or any other, but they presuppose a correct rate for the exposure, by whatever process reached, as a necessary factor in computing the exposure charge.

It will be conceded that the correct measure of the exposure to a brick building by another of similar hazard sufficiently near to it to cause damage would be such percentage of the occupied, exposed rate (No. 131, page 21 of the Universal Schedule) of the exposing building (after deducting whatever may have been added in its rate, for the exposure to it by the risk which is to be rated) as would pay for the damage. There should be first eliminated from the rate of the exposure, it will be conceded, whatever may have been included in it for the exposure to it by the risk to be rated; otherwise, the effect would be to charge for the exposure of the risk itself.

The percentage of the exposure rate to be added to the risk to be rated should vary, not only with the distance or intervening space between the two risks but, also, according to the nature of the construction and occupancy of the exposure and the probabilities of its having frequent fires and intense fires causing total destruction, or what may be termed its "ignitibility" and "combustibility."

Inasmuch as the Universal Schedule, by its occupied and exposed rate (No. 131), will have measured all important features of the exposure—construction, area, height, ignitibility and combustibility of contents and the exposures to it of other hazards than the risk to be rated—a percentage of its rate charged will be the proper measure of its influence upon the risk.

By way of illustration, if the occupied, exposed rate of a risk is 90 cents and this 90 cents includes, say 10 cents, which has been added for the exposure of the risk to be rated, 80 cents is the net, occupied, exposed rate the percentage of which should be added to the risk to be rated to measure whatever danger may be apprehended from the proximity of the exposing hazard. If the risk would be damaged to the extent of say $2,000 by the burning of the exposure then the rate of the risk should be increased by such amount as would yield a premium on $2,000 at the rate (80 cents) of the hazard which would cause the loss, whose probabilities of burning, &c., are indicated or measured by its rate of 80 cents. If the risk to be rated is one which carries $10,000 insurance, then it is clear that the Company insuring it will be carrying, in addition to its own hazard, a liability to loss of $2,000 by the burning of the exposure, and should receive for such risk $16 additional premium ($2,000 at a rate of 80 cents). To secure $16 on $10,000 insurance, would require an addition to the rate of the risk (whatever its rate may be) of 16 cents per $100, and if the specific rate of the risk be 60 cents, its exposed rate would be 76 cents; if 1 %, the exposed rate would be 116, &c. As before stated, the probabilities of damage must be determined by considering the intervening space and the character and construction of either or both of the two buildings, not forgetting their relative height.

It is difficult to reduce all of these considerations to a uniform rule, but the following rules and tables will enable a rating expert to approximately estimate the exposure in all cases, having in mind certain important considerations or propositions hereinafter explained.

RULE FOR ESTIMATING EXPOSURES

OF BRICK BUILDINGS TO BRICK BUILDINGS WITH OPENINGS WHERE THE SCHEDULE RATE OF THE EXPOSURE DOES NOT EXCEED THAT OF THE RISK BY MORE THAN 50 CENTS.

RULE: If the intervening space be less than 100 feet, add $\frac{2}{10}$ of 1% of the exposure rate for each foot that the intervening space is less than 100 feet in width, on "protected risks" (i. e. with hydrants within 500 feet), and same amount for each foot less than 120 feet on "unprotected" risks.

For example, if the distance between the risk and its exposure be 90 feet, the addition would be $\frac{2}{10}$ of 1% for each of the ten feet less than 100, or 2% of the exposure rate. If the exposure should be only 50 feet distant, the charge should be $\frac{2}{10}$ of 1% of the rate of the exposure for each of the 50 feet that the distance is less than 100 feet, or 10%. If the exposure is only 10 feet distant, the addition would be 18% of the exposure rate. At this distance, with openings, the two risks would be nearly one hazard and the situation would be almost identical with a risk of the combined area of the two, making allowance for division walls, and charging for extra staircases, elevators, tenants, &c.: see note item No. 62, U. M. S.

The prevailing practice, at 10 feet, under such circumstances, has been to make the rates of the two risks equal, inasmuch as the intervening distance is so slight that the probabilities are that both would burn together, but such estimate would overlook an important fact, viz., that all fires are not total. In risks of ordinary hazard, brick mercantile risks, for example, 70% are under $100 and, under the protection of fire departments, not exceeding 5% are total. It is seldom that partial losses in a brick building damage other risks. Therefore, in estimating the danger of an exposure, that portion of its Schedule rate which is intended to measure the claims for partial losses although forming a proper part of the loading of the rate of the exposure itself ought not to charged to the risk exposed. It should, moreover, be remembered that, even in the case of fires totally destroying an exposure, there are some chances that, at a distance of only 10 feet, the exposed building would escape,

by reason of the nature and direction of the wind at the time of the fire. (See diagrams, page 68 etc.)

The measure of exposure damage of a building ten feet distant, with window openings in both, however, ought not to differ materially from what would be the rate of both risks if they were computed as one risk of the total area, allowing the deduction for the division walls (item No. 62) and charging for the extra tenants, stairways, &c. In other words, the rate of two 50 foot front risks, within ten feet of each other, with openings in both ought certainly not be greater than that of a 100′x 100′ risk, calculating the area, occupancy, extra tenants, &c., as per the Schedule. In such a case there would be a charge for area under No. 59, 24 cents (less deduction for two subdividing walls), charge for at least one extra tenant, 2 cents, an extra staircase, extra elevator, heating apparatus, etc., all subject to deductions for proximity to hydrants, 155, etc., (there would be no deductions from exposures, charge for which is net, see No. 130) which would bring the two rates very closely together.

In estimating the probabilities of ignition by a burning exposure, the law of physics as to the radiation of heat at given distances does not apply until the brick wall of the exposing building, if not that of the risk also, has succumbed. Especially in case of an exposure with a blank wall, but also in the case of a wall with window openings, the question whether, at the given distance, the probabilities are in favor of destruction of the risk by the exposure is one of underwriting judgment and not of science, depending upon the construction of the wall, the nature and size of openings, &c., and the possibilities of a collapse which would expose the risk to the full effect of the volume of fire in the exposing building.

RULE WHERE THE RATE OF THE EXPOSURE MATERIALLY EXCEEDS THAT OF THE RISK.

Where, however, the rate of one risk is materially greater than that of the other, indicating greater ignitibility and combustibility, something should be added to the minor hazard for the excess rate of the major hazard, so that while an ordinary,

mercantile risk would not add materially to another of like hazard, a planing-mill, subject to more frequent fires and more intense combustion, ought to add a percentage of its excess rate, gradually increasing with the deficiency distance between the two. Thus each additional stratum or layer of hazard, so to speak, should be provided for. This fact is frequently overlooked in tables for computing exposure hazard.

The danger from an exposure increases not only inversely with the distance between the two, but also directly as the rate of exposure exceeds that of the risk, indicating greater ignitibility, combustibility, &c. If one should approach a fire with a thermometer, the mercury would rise with each foot of approach. It would also rise in proportion to the intensity and volume of the fire. The exposure of a 1% risk by a 1% risk would be greater at 10 feet distant than at 60 feet distant, but the exposure of a 3% risk at 10 feet would also be greater than that of a 1% risk at the same distance. The difference, moreover, is not a *pro rata* or single percentage increase. These considerations, therefore, give rise to the following rule:

RULE: Calculate the addition in rate for exposure on the basis of what it would be if both hazards were similar, viz., for so much of the rate of the exposure hazard as equals the rate of the risk itself, and add to the amount $\frac{1}{10}$ *of* 1% FOR EACH 100 CENTS OF RATE *that the exposure exceeds that of the risk,* FOR EACH FOOT OF DEFICIENCY *distance as per Table B, in case the risk is "protected," or by Table D if not "protected."*

For example, suppose a 2% risk exposes a 1% protected risk at 20 feet. There should be added to the 1% risk 16 cents by Table A and 8 cents by Table B—in all 24 cents; so that the exposed rate would be 1.24.

Where the major or greater exposure hazard is not directly opposite. but to one side of the line of frontage, calculate the exposure by the risk opposite, which will contain in its rate the exposure of any major hazards in the same row or block.

Prevailing Wind. If the prevailing wind blows from exposure toward risk, increase exposure charge in Tables A and C 10%; if from risk toward exposure, decrease exposure charge 10%.

Glass fronts or sides. If the building has an excessive amount of glass in its walls, show-windows, etc., for display of goods, exceeding in glass area 70% of the square surface of the first, second or other stories, increase the amount of exposure charge by 10% of its amount for the first or grade-floor glass story, and by 20% for the second story and 10% for each additional glass story, but not exceeding a total which shall increase the rate of the risk to exceeding 80% of a higher rated exposure. For example, if the exposure charge is 20 cents and there be two glass stories, the charge should be 26 cents. If one glass story, grade floor 22 cents, &c.

If the exposure has glass sides or stories toward the risk, increase the exposure charge 20% for each glass story above the first.

Many of our city store buildings have so much glass in their enclosing walls that they are no stronger for resisting fire than so many glass show cases.

Shingle roofs. The tables are intended for buildings having metal, tile, slate or approved gravel roofs. If the risk has a shingle roof, increase the exposure charge 50% *of its amount* (not 50% of the rate of the exposure) but not exceeding a sum which would make the rate of the risk equal to that of the exposure.

Frame exposures to Brick Buildings. Charge 50% more than for Brick exposure as per Tables A and C, (Tables E and F are intended for Brick and Stone buildings only) but not exceeding a sum which shall make the rate of the building equal to 80% of that of the frame building.

Wooden Cornices, Wooden mansard, &c. Even if building has blank wall, charge the same per tables as for buildings with openings, at the given distance.

Buildings with Stone Fronts. Increase the final exposure charge by 10% of its amount if plain finish and by 20% of its amount if carved or ornamental finish. For example, the charge for exposure being 10 cents, if plain stone front, should be 11 cents and if ornamental, 12 cents.

Stocks. If building has blank wall toward exposure, charge 30% less on stock than on building. Grade floor Stocks in unprotected buildings, 50% less than charge on building (stocks

above grade, same charge as building). Stocks in Standard buildings, one-half the charge for exposure to building, no matter on what floor located.

Height. If the risk is less than five stories high, deduct from the total, final exposure charge, 15% thereof for each story less than five in height, and add 15% for each story in excess of five.

HEIGHT OF EXPOSURE. If the exposure is less than five stories high, deduct 10% of charge for each story less than five but add 25% for each story over five. For example, the exposure for a 2% risk at 20 feet being 32 cents, if only two stories high 30%, or 9 cents, should be deducted, making the charge 21 cents.

Buildings adjoining each other. Where brick or stone buildings adjoin each other in blocks, a charge should be made as per Tables E and F for exposure. As already stated, these two tables are not intended for frames.

Defective walls. Walls having deficiency charges under No. 39 or No. 41 of the Schedule should entail a greater charge for exposure as per tables. If the two adjoining walls are independent, it may be that the two, although one may be defective, would be equivalent to a fire stop and one half the charge may be made—see tables E and F.

Wall not through Roof. If division wall between two adjoining risks does not extend through roof, cutting off roof timbers, charge same as per tables E and F for communications above first floor with single fire door.

Falling Wall Hazard. If the adjoining building be of greater height than the risk to be rated by a difference of 50 feet or over, increasing the danger of falling on the risk, charge not less than 2% of the rate of exposure, in addition to the Table charges. In case there are windows or other openings in the excess height, charge for exposure to the higher building by the lower, as per tables E and F, and one-half as much to the lower building for the exposure by the higher, unless the windows in the higher are not within 6 feet of the roof of the lower, in which case charge one-fourth; see Tables E and F.

If the exposed side or surface of the risk be less than 75 running feet, deduct 1% of the exposure charge for each foot less; for

example, if the front, rear or side wall exposed be 50 feet, deduct 25%; if 40 feet, 35%; if 25 feet, 50%. *If the side or surface of the exposure* toward the risk be less than 75 running feet, deduct ½ of 1% for each foot less. *No deduction under these items, however, if the exposure building contain Oils or other "grease risks," Wholesale Drugs, stocks of Furniture, Agricultural Implements, Carriage or Wagon materials or other wood risks—hazards of intense combustibility.*

Exposure of exceptional areas. If the exposure has an unbroken, ground floor area exceeding 10,000 square feet, increase the final exposure charge 30%, and a further 5% for each 1,000 square feet of area in excess of 10,000.

Unbroken areas and large risks of this character when once thoroughly on fire have an exposure effect which the best fire departments are seldom able to control.

Fire Shutters—These, while supposed to be equal to blank walls, are worth little more than half their theoretical value within a distance of 40 feet.

For fire shutters to the risk deduct 50% of charge.
" " " " exposure " 30% " "
" " " " both risk and
exposure deduct 60% " "

If intervening distance exceeds 40 feet, increase the percentage of deduction by 1% for each foot that the distance exceeds 40 feet, not exceeding a total deduction of 90%.

Analysis of exposure hazard. It is sometimes the case that a special hazard of high rate may have its least dangerous portion, the office building or warehouse, for example, nearest the risk, while the more hazardous portion may be sufficiently remote to justify calculation of the exposure by that portion which would endanger the risk. The New York Building Law, for example, requires that all theatres having stores upon the street front shall have such stores cut off from the rest of the theatre by a fire wall. In this case it would be unjust to include in the exposure to a building opposite the full charge for the rear portion or more dangerous section of the theatre. Judgment must be used in such cases, and the same rule should govern for calculating the exposure as if the two parts were separate risks, the more dangerous portion exposing the less hazardous.

If both risk and exposure rates are less than 1%, pro-rate for both; for example, the exposure of a 1% risk at 20 feet being 16 cents (Table A) the exposure of a 25 cent risk would be 4 cents, and to a 25 cent risk 1 cent.

EXPOSURE RATING SLIP.

These various considerations have been provided for in a rating slip arranged for easy computation, and the operation is less complicated than a perusal of the foregoing paragraphs would seem to indicate.

The tables A and C were arrived at in the following manner:

The effect of an exposure being, as already stated, inversely as the distance and directly as to ignitibility, combustibility, weakness of construction, &c., of the exposure, it follows that the proportion of an exposure rate to be added to a risk should be increased as the distance between the two decreases, and also in proportion as the rate of the exposure exceeds that of the risk to be rated. On this basis, 120 feet being regarded as a safe distance in unprotected risks and 100 feet in the case of protected risks, two-tenths of one per cent of the exposure rate is added for each foot of the deficiency distance, or 2% of the rate for each 10 feet less than the safe distance; provided, however, that the rate of the exposure does not exceed that of the risk and that they are, therefore, similar hazards. On this basis if the separating distance on a protected risk is 70 feet, 6% should be added; if 60 feet, 8%; if 50 feet, 10%; if 10 feet, 18%, &c., &c.

Tables B and D are arrived at by computing the exposure charge for EACH 100 CENTS OF EXCESS OF EXPOSURE RATE, in accordance with the rule already stated of adding $\frac{1}{10}$ of 1% for each foot of deficiency distance *for each* 100 *cents of rate that the exposure exceeds that of the risk.* On this basis, in the case of a protected or fire department risk at 70 feet distant, 3% of the excess exposure rate should be added *for each* 100 *cents* of such excess, at 60 feet 4%; at 50 feet, 5%; at 10 feet 9%, &c. Thus, if the exposure rate exceeds that of a risk by 2% at 10 feet distance, 18% of such 2%, or 36 cents, should be added. If the exposure rate exceeds that of the risk by 300 cents, at 30 feet distance, 7% of the excess rate *for each* 100 *cents of excess*, or

21% thereof, (amounting to 63 cents) should be added for the excess exposure; see table B.

It is thus necessary to have two sets of tables, for while a pro-rata percentage addition would measure the exposure of risks of the same hazard, such an addition would not be sufficient for the exposure to a risk of minor hazard by one of greater danger. The risk would increase in proportion to the difference in hazard, and after adding for the excess as per table B and D, the exposure charge for so much of the exposure as equals its own rate must be added; otherwise a small excess might be the only charge made in high rated risks of nearly the same rate.

The mistake too often made of adding to the risk the same percentage of the rate of the exposing building, no matter whether the exposure be a high rated risk or a low rated risk, is more fully explained on pages 72, and 73 (see ante.) For example, it is customary in most tables for computing exposure rates, like Table "A," for instance, where a 1% exposure is 18 cents, to add 1.26 (which would be 18% of 7%,) for exposure to a 1% risk by a 7% risk, instead of first taking 18 cents for the exposure of 1% of the exposure and adding 3.24 for the 600 cents excess of the exposure rate. This would make 3.42 as an exposure charge, the 1% risk being rated 4.42 and the 7% risk 7.18. Where the same percentage is taken, as is so frequently the case, the 1% risk would be rated at 2.26, and any underwriter, at this great difference between the two rates, would select the 7% hazard for a smaller line.

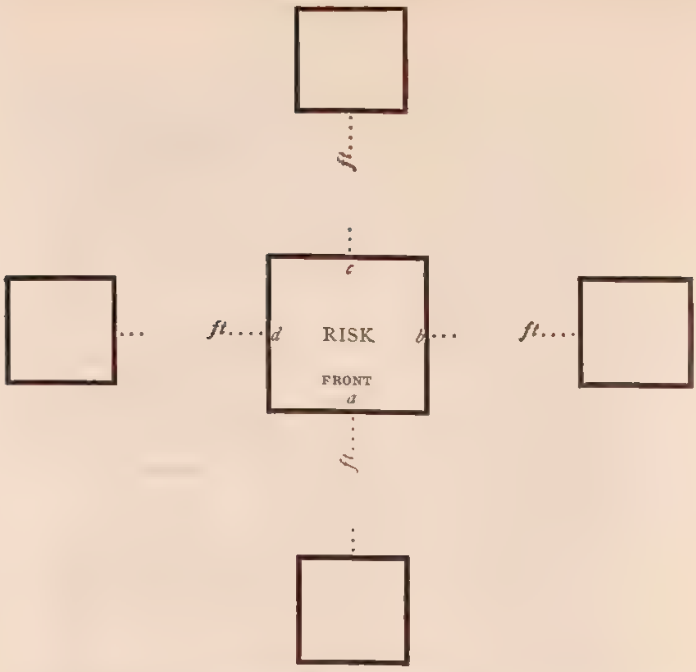
No other difference than that of the foregoing rules should be made between fire department and non-fire department towns, inasmuch as the Universal Schedule, in its key-rate and, also, in the subsequent deductions for proximity to hydrants, steam-engines, etc., will have, at No. 131, correctly measured and considered the difference between protected and unprotected risks in the probabilities of controlling and extinguishing a fire and, therefore, of preventing its spread. The question, at this point, becomes simply one of physical volume and distance.

Order of computation. The accompanying rate slip shows the order in which the computation of exposure hazards should be made.

It may be claimed that the detail features herein treated are too numerous and the computation suggested too complicated,

but there are no considerations mentioned which an intelligent expert would overlook in estimating exposure danger, and he certainly cannot be hindered by having a list of them with a charge for each.

N. B.—The criticism has been made of this scheme of exposure charges that because risks of intense combustibility, such as oil stocks or wood workers, would be more likely to destroy buildings exposed by them than would stocks of the same high rate though of a harmless character, like millinery, hops, wall-paper, etc., a higher percentage of the rates of risks of intense combustibility should be added to measure the exposure danger. But this view overlooks an important fact, viz., that it is the percentage of the rate of the exposure *building*, and not of its stock or contents, which is used for exposure charges. The question whether contents of great ignitibility or intense "combustibility" will burn the building which contains them is identical with that of whether they will damage an exposed risk and is measured in the rate of the exposure building. Stocks of wall-paper or millinery in a building exposing another would themselves be rated high because of their susceptibility to damage, but the building containing them would not, for they do not make hot fires or increase the rate of a building. On the other hand, oils in a building exposing another, might not themselves be rated higher than millinery or wall-paper, but the building containing them would be rated higher than one containing the harmless stocks named; and it is the percentage of this higher building rate which is used for the exposure charge. If the exposure charge on this basis is deemed inadequate to measure the probabilities of the destruction of the exposed risk, it would argue, not that the percentage of exposure is wrong, but that the rate of the exposing building, containing the oils, etc., is inadequate, and if the rate of the building containing the oils is not high enough to measure the probabilities of its destruction by its contents, it should be raised. Of course, if the oils will not destroy their own building they cannot destroy the building of the exposure.



RATING SLIP.—Exposures Brick Bdgs.

N. B.—Calculate the exposure, as per table, for given distance or condition for each side and enter in its column, then add or subtract from charge as follows; carrying the net result by successive processes down the column to the bottom.

Distance ... feet	Distance ... feet	Distance ... feet	Distance ... feet
Front	Right (facing risk)	Rear	Left (facing risk)
A	B	C	D

Buildings Separated.—With openings.

N. B.—(Wooden Roof, Cornice or Wooden Mansard same as openings.)

Blank Wall of Risk toward exposure, deduct $\frac{2}{3}$ of charge if protected (*i. e. Fire Dept.*) $\frac{1}{3}$ if not.) *No deduction if wooden roof, cornice or mansard.*)

" " of Exposure toward risk, deduct $\frac{1}{3}$ if protected $\frac{1}{3}$ if not.)

" " **To both** deduct 90 per cent if protected ($\frac{4}{5}$ if not.)

Openings not opposite to each other deduct 30 per cent

" **on grade or first floor only,** deduct 25 per cent

Fire Shutters.—To window openings of risk deduct 50 % of charge

" " To window openings of exposure deduct 30 %.

" " **to Both** risk and exposure deduct 60 %. If the intervening distance exceeds 40 feet increase the percentage of deduction by 1 % for each foot that distance exceeds 40 feet not exceeding a total deduction of 90 %.

Shingle Roof to Risk increase charge 50 per cent but not exceeding a sum which would make risk equal rate with exposure

If Buildings Adjoining—Charge as per table E and F

(Tables E and F are not intended for frames.)

Where the Occupancy Table first column charge of the adjoining exposure exceeds that of the risk, add one sixth of the excess to above charges unless the separating walls are independent, without communication and carried above roof. For example, if risk be No 423 and exposure No 806, one sixth of 90 cts or 15 cts. should be added for No 423

N. B.—No deduction for Fire Doors to communications if exposure be an Oil or "Grease" risk—rate as one hazard.

Wall not through Roof.—If division wall between two adjoining risks does not extend through roof, cutting off roof timbers charge same as per tables E and F for communications above first floor with single fire door.

Rate of Exposure less than 1 per cent., pro-rate charge.

Length of Exposed Side of Risk.—Less than 75 running feet, 1 per cent. less for each foot. *No deduction if adjoining with communication.*

" of Exposure.—Less than 75 feet $\frac{1}{2}$ per cent less for each foot.

(N. B.—No deduction under these items, however, if the exposure building contain hazards of intense combustibility—Oils or other "grease risks" Wholesale Drugs, stocks of Furniture Agricultural Implements, Carriage or Wagon materials or other wood risks

Height of Exposure.—If less than five stories deduct 10 per cent. for each story less than five. If over 5 stories add 25 per cent. for each story over 5

Falling Wall Hazard.—Add not less than 2 per cent of the rate of the exposing risk.

Glass Front or Side of Risk.—Increase charge 10 per cent. if first story, 20 per cent for second, and ten per cent. for each additional story.

" " **of Exposure.**—Increase charge 20 per cent for each glass story above first or grade floor

Stone Front.—If plain finish increase charge 10 per cent. If carved or ornamental finish increase 20 per cent.

Large Unbroken Area of Exposure exceeding 10,000 square feet increase charge 30 per cent. and add a further 5 per cent for each 1,000 in excess of 10,000.

Frame Exposure increase charge 50 per cent. but not exceeding a sum which shall make rate of risk equal to 80 per cent. of exposure

Note. Tables E and F for adjoining buildings are intended for Brick and Stone buildings only

Prevailing Wind.—If toward risk increase charge 10 per cent. If toward exposure decrease charge 10 per cent.

If both Risk and Exposure rate are below 1 per cent take such percentage of final result as the rate of risk bears to one per cent. *e. g.* if 65 cents, 65 per cent, if 45 cents, 45 per cent &c

Total Exposure Charge for all sides.

Height of Risk.—If under 5 stories high, deduct 15 per cent of total charges for each story less than five. If over five stories high add 15 per cent for each story over five.

Stocks.—If building separated has blank wall toward exposure, charge 30 per cent. less on stock than on building.

Grade Floor Stocks in unprotected building 50 per cent less than charge on building (stocks above grade, same charge as building.)

Stocks in Standard buildings one-half the the charge for exposure to building no matter on what floor located.

TABLE A. PROTECTED RISKS—SEPARATED.

(i. e. within 500 feet of hydrants.)

BRICK BUILDINGS BY BRICK BUILDINGS WITH OPENINGS.

Exposure Distance or Separating Space	Rate of Exposure 100 cents	Rate of Exposure 200 cents	Rate of Exposure 300 cents	Rate of Exposure 400 cents	Rate of Exposure 500 cents	Rate of Exposure 600 cents	Rate of Exposure 700 cents
	AMOUNT TO BE ADDED FOR EXPOSURE.						
10 feet.	.18 cts	.36 cts	.54cts	.72cts	.90cts	1.08cts	1.26cts
20 "	.16 "	.32 "	.48 "	.64 "	.80 "	.96 "	1.12 "
30 "	.14 "	.28 "	.42 "	.56 "	.70 "	.84 "	.98 "
40 "	.12 "	.24 "	.36 "	.48 "	.60 "	.72 "	.84 "
50 "	10 "	.20 "	.30 "	.40 "	.50 "	.60 "	.70 "
60 "	.08 "	.16 "	.24 "	.32 "	.40 "	.48 "	.56 "
70 "	.06 "	.12 "	.18 "	.24 "	.30 "	.36 "	.42 "
80 "	04 "	.08 "	.12 "	.16 "	.20 "	.24 "	.28 "
90 "	.02 "	.04 "	.06 "	.08 "	.10 "	.12 "	.14 "
100 "	00 "	.00 "	.00 "	.00 "	.00 "	.00 "	.00 "

If the rate be less than 1 %, reduce pro-rata.

RULE: **If the rate of the exposure does not exceed that of the risk** *by more than 50 cents, add the amount named in the above table, A, for the given distance.*

If the rate of the exposure exceeds that of the risk *by more than 50 cents, add the amount named in the above table for so much of the rate of the exposure as equals the rate of the risk itself, and also the amount for the given distance in the following table for such amount as the exposure exceeds the rate of the risk.*

For example, if a 2 % risk exposes a 1 % risk at 20 feet, the amount named for 1 % in the above table opposite 20 feet is 16 cents, and in Table B below for 100 cents excess is 8 cents making a total of 24 cents. If a 3 % risk exposes a 2 % risk, the amount for 2 % in Table A above at 20 feet is 32 cents, and for 100 cents excess in Table B below is 8 cents, making a total of 40 cents. Thus the rate of the risk would be 2 40. The exposed rate of the 3 % risk would be that of 200 cents in Table A at 20 feet, 32 cents, making total exposed rate 3 32.

IF RISK HAS BLANK WALL toward exposure deduct four-fifths amounts named in Tables. If risk has openings, but EXPOSURE HAS BLANK WALL toward risk, deduct one-half amounts named in the Tables.

IF BOTH WALLS BLANK, deduct ninety per cent of amount named in Tables.

IF OPENINGS NOT OPPOSITE each other, deduct 30 %. If openings on grade floor only, deduct 25 %.

For FIRE SHUTTERS to the risk deduct 50 % of charge.
" " " " exposure " 80 % " "
" " " " both risk
and exposure " 60 % " "

If intervening distance exceeds 40 feet increase the percentage of deduction by 1 % for each foot that the distance exceeds 40 feet, not exceeding a total deduction of 90 %.

TABLE B.

Exposure Distance or Separating Space.	ADD TO ABOVE FOR EXCESS OF EXPOSURE RATE.						
	Add for 100 cents excess	Add for 200 cents excess	Add for 300 cents excess	Add for 400 cents excess	Add for 600 cents excess	Add for 600 cents excess	Add for 700 cents excess
10 feet.	.09 cts	.36 cts	.81 cts	1.44cts	2.25cts	3.24cts	4.41cts
20 "	.08 "	.32 "	.72 "	1.28 "	2 00 "	2.88 "	3 92 "
30 "	.07 "	.28 "	.63 "	1.12 "	1.75 "	2 52 "	3 43 "
40 "	.06 "	.24 "	.54 "	.96 "	1.50 "	2.16 "	2.94 "
50 "	.05 "	.20 "	.45 "	.80 "	1.25 "	1.80 "	2.45 "
60 "	.04 "	.16 "	.36 "	.64 "	1.00 "	1.44 "	1.96 "
70 "	.03 '	.12 "	.27 "	.48 "	.75 "	1.08 "	1.47 "
80 "	.02 "	.08 "	.18 "	.32 "	.50 "	.72 "	.98 "
90 "	.01 "	.04 "	.09 '	.16 "	.25 "	.36 "	.49 "
100 "	.00 "	00 "	00 "	.00 "	.00 "	00 "	.00 "

TABLE E. PROTECTED RISKS—ADJOINING

BUILDINGS ADJOINING *	Rate of Exp're 100 cts	Rate of Exp're 200 cts	Rate of Exp're 300 cts	Rate of Exp're 400 cts	Rate of Exp're 500 cts	Rate of Exp're 600 cts	Rate of Exp're 700 cts
	AMOUNT TO BE ADDED FOR EXPOSURE.						
WALLS NOT DEFICIENT exceeding 10 cents under Nos 38 or 39	cents 02	cents .04	cents .12	cents .16	cents .20	cents .24	cents .28
WALLS DEFICIENT exceeding 10 cents under 38 or 39.	.06	.12	.18	.24	.30	.36	.42
If one wall deficient one-half chg	.03	.06	09	.12	.15	.18	.21
WALL HIGHER and openings in excess height, on higher building	08	.24	.36	.48	.60	.72	.84
Charge on lower building	02	.10	.15	.20	.25	.30	.35
B'D'GS COMMUNICATING on the grade floor with single fire door	.08	.16	.42	.56	.70	.84	.98
If above grade floor " " "	.14	.28	.54	.72	.90	1.08	1.26
(If double doors, one-half charges.) N B No DEDUCTION FOR FIRE-DOORS, if exposure be an OIL OR "GREASE" RISK—rate as one hazard.							
PARTY WALL with deficiencies not over 24 cents under 40 or 41.	.03	.06	.18	.24	.30	.36	.42
PARTY WALL if deficiencies exceed 24 cents under 40 and 41, or if, any portion of wall is less than 12 inches thick	.08	.16	.24	.32	.40	.48	.56

WALL LONGER OR SHORTER, openings being at right angles, charge one-fourth of what would be charge for distance between nearest openings by tables A and B.

** Where the Occupancy Table first column charge of the adjoining exposure exceeds that of the risk, add one-sixth of the excess to above charges unless the separating walls are independent, without communications and carried above roof.*

RULE **If the rate of the exposure does not exceed that of the risk** *by more than 50 cents, add the amount named in the above table.*

If the rate of the exposure exceeds that of the risk *by more than 50 cents, add the amount named in the above table for so much of the rate of the exposure as equals the rate of the risk itself, and also the amount for the deficiency in the following table for such amount as the exposure exceeds that of the risk.*

BUILDINGS ADJOINING.	ADD TO ABOVE FOR EXCESS OF EXPOSURE RATE.						
	Add for 100 cts excess	Add for 200 cts excess	Add for 300 cts excess	Add for 400 cts excess	Add for 500 cts excess	Add for 600 cts excess	Add for 700 cts excess
WALLS NOT DEFICIENT exceeding 10 cents under Nos 38 or 39	cents .03	cents .15	cents .45	cents 80	cents 1 25	cents 1.80	cents 2.45
WALLS DEFICIENT exceeding 10 cents under 38 or 39	.08	.32	.72	1.28	2.00	2.88	3.92
If one wall deficient one-half chg	.04	16	.36	1.14	1.00	1.44	1.96
WALL HIGHER and openings in excess height charge on higher building	.08	.24	.54	.96	1.50	2.16	2.94
Charge on lower building	02	.10	.15	.20	.25	.30	.35
B'D'GS COMMUNICATING on the grade floor with single fire door	.06	.28	.63	2.12	2.75	3.52	4.43
If above grade floor " " "	.18	62	1.89	2.44	3 25	4.24	5.41
(If double doors, one-half charges.)							
PARTY WALL with deficiencies not over 24 cents under 40 or 41	.06	.20	.54	.96	1.50	2.16	2.94
PARTY WALL if deficiencies exceed 24 cents under 40 and 41, or if, any portion of wall is less than 12 inches thick	.09	.36	.81	1.44	2.25	3.24	4.41

TABLE A. PROTECTED RISKS—SEPARATED.

(*i. e. within* 500 *feet of hydrants.*)

BRICK BUILDINGS BY BRICK BUILDINGS WITH OPENINGS.

Exposure Distance or Separating Space.	Rate of Exposure 100 cents	Rate of Exposure 200 cents	Rate of Exposure 300 cents	Rate of Exposure 400 cents	Rate of Exposure 500 cents	Rate of Exposure 600 cents	Rate of Exposure 700 cents
	AMOUNT TO BE ADDED FOR EXPOSURE.						
10 feet.	.18 cts	.36 cts	.54cts	.72cts	.90cts	1.08cts	1.26cts
20 "	.16 "	.32 "	.48 "	.64 "	.80 "	.96 "	1.12 "
30 "	.14 "	.28 "	.42 "	.56 "	.70 "	.84 "	.98 "
40 "	.12 "	.24 "	.36 "	.48 "	.60 "	.72 "	.84 "
50 "	.10 "	.20 "	.30 "	.40 "	.50 "	.60 "	.70 "
60 "	.08 "	.16 "	.24 "	.32 "	.40 "	.48 "	.56 "
70 "	.06 "	.12 "	.18 "	.24 "	.30 "	.36 "	.42 "
80 "	.04 "	.08 "	.12 "	16 "	20 "	.24 "	.28 "
90 "	.02 "	.04 "	.06 "	.08 "	.10 "	.12 "	.14 "
100 "	.00 "	.00 "	.00 "	.00 "	.00 "	.00 "	.00 "

If the rate be less than 1 %, *reduce pro-rata.*

RULE: **If the rate of the exposure does not exceed that of the risk** *by more than* 50 *cents, add the amount named in the above table, A, for the given distance.*

If the rate of the exposure exceeds that of the risk *by more than* 50 *cents, add the amount named in the above table for so much of the rate of the exposure as equals the rate of the risk itself, and also the amount for the given distance in the following table for such amount as the exposure exceeds the rate of the risk.*

For example, if a 2 % risk exposes a 1 % risk at 20 feet, the amount named for 1 % in the above table opposite 20 feet is 16 cents, and in Table B below for 100 cents excess is 8 cents making a total of 24 cents. If a 3 % risk exposes a 2 % risk, the amount for 2 % in Table A above at 20 feet is 32 cents, and for 100 cents excess in Table B below is 8 cents, making a total of 40 cents. Thus the rate of the risk would be 2. 40. The exposed rate of the 3 % risk would be that of 200 cents in Table A at 20 feet, 32 cents, making total exposed rate 3. 32.

IF RISK HAS BLANK WALL toward exposure deduct four-fifths amounts named in Tables. If risk has openings, but EXPOSURE HAS BLANK WALL toward risk, deduct one-half amounts named in the Tables.

IF BOTH WALLS BLANK, deduct ninety per cent of amount named in Tables.

IF OPENINGS NOT OPPOSITE each other, deduct 30 %. If openings on grade floor only, deduct 25 %.

For FIRE SHUTTERS to the risk deduct 50 % of charge.
" " " " exposure " 30 % " "
" " " " both risk
and exposure " 60 % " "

If intervening distance exceeds 40 feet increase the percentage of deduction by 1 % for each foot that the distance exceeds 40 feet, not exceeding a total deduction of 90 %.

TABLE B. Exposure Distance or Separating Space.	Add for 100 cents excess	Add for 200 cents excess	Add for 300 cents excess	Add for 400 cents excess	Add for 500 cents excess	Add for 600 cents excess	Add for 700 cents excess
	ADD TO ABOVE FOR EXCESS OF EXPOSURE RATE.						
10 feet.	.09 cts	.36 cts	.81 cts	1.44cts	2.25cts	3.24cts	4.41cts
20 "	.08 "	.32 "	.72 "	1.28 "	2.00 "	2.88 "	3.92 "
30 "	.07 "	.28 "	.63 "	1.12 "	1.75 "	2.52 "	3.43 "
40 "	.06 "	.24 "	.54 "	.96 "	1.50 "	2.16 "	2.94 "
50 "	.05 "	.20 "	.45 "	.80 "	1.25 "	1.80 "	2.45 "
60 "	.04 "	.16 "	.36 "	.64 "	1.00 "	1.44 "	1.96 "
70 "	.03 "	.12 "	.27 "	.48 "	.75 "	1.08 "	1.47 "
80 "	.02 "	.08 "	.18 "	.32 "	.50 "	.72 "	.98 "
90 "	.01 "	.04 "	.09 "	.16 "	.25 "	.36 "	.49 "
100 "	.00 "	.00 "	.00 "	.00 "	.00 "	.00 "	.00 "

TABLE E. PROTECTED RISKS—ADJOINING

BUILDINGS ADJOINING *	Rate of Exp're 100 cts	Rate of Exp're 200 cts	Rate of Exp're 300 cts	Rate of Exp're 400 cts	Rate of Exp're 500 cts	Rate of Exp're 600 cts	Rate of Exp're 700 cts
	AMOUNT TO BE ADDED FOR EXPOSURE.						
WALLS NOT DEFICIENT exceeding 10 cents under Nos. 38 or 39.	cents .02	cents .04	cents .12	cents .16	cents .20	cents .24	cents .28
WALLS DEFICIENT exceeding 10 cents under 38 or 39.	.06	.12	.18	.24	.30	.36	.42
If one wall deficient one-half chg.	.03	.06	.09	.12	.15	.18	.21
WALL HIGHER and openings in excess height, on higher building	.08	.24	.36	.48	.60	.72	.84
Charge on lower building.	.02	.10	.15	.20	.25	.30	.35
B'D'GS COMMUNICATING on the grade floor with single fire door	.08	.16	.42	.56	.70	.84	.98
If above grade floor " " "	.14	.28	.54	.72	.90	1.08	1.26
(If double doors, one-half charges.) N. B.—NO DEDUCTION FOR FIRE-DOORS, if exposure be an OIL OR "GREASE" RISK—rate as one hazard.							
PARTY WALL with deficiencies not over 24 cents under 40 or 41.	.03	.06	.18	.24	.30	.36	.42
PARTY WALL if deficiencies exceed 24 cents under 40 and 41, or if, any portion of wall is less than 12 inches thick.	.08	.16	.24	.32	.40	.48	.56

WALL LONGER OR SHORTER, openings being at right angles, charge one-fourth of what would be charge for distance between nearest openings by tables A and B.

* *Where the Occupancy Table first column charge of the adjoining exposure exceeds that of the risk, add one-sixth of the excess to above charges unless the separating walls are independent, without communications and carried above roof.*

RULE: **If the rate of the exposure does not exceed that of the risk** *by more than* 50 *cents, add the amount named in the above table.*

If the rate of the exposure exceeds that of the risk *by more than* 50 *cents, add the amount named in the above table for so much of the rate of the exposure as equals the rate of the risk itself, and also the amount for the deficiency in the following table for such amount as the exposure exceeds that of the risk.*

BUILDINGS ADJOINING.	ADD TO ABOVE FOR EXCESS OF EXPOSURE RATE.						
	Add for 100 cts excess	Add for 200 cts excess	Add for 300 cts excess	Add for 400 cts excess	Add for 500 cts excess	Add for 600 cts excess	Add for 700 cts excess
WALLS NOT DEFICIENT exceeding 10 cents under Nos. 38 or 39.	cents .03	cents .15	cents .45	cents 80	cents 1.25	cents 1.80	cents 2.45
WALLS DEFICIENT exceeding 10 cents under 38 or 39.	.08	.32	.72	1.28	2.00	2.88	3.92
If one wall deficient one-half chg.	.04	.16	.36	1.14	1.00	1.44	1.96
WALL HIGHER and openings in excess height charge on higher building.	.08	.24	.54	.96	1.50	2.16	2.94
Charge on lower building.	.02	.10	.15	.20	.25	.30	.35
B'D'GS COMMUNICATING on the grade floor with single fire door.	.06	.28	.63	2.12	2.75	3.52	4.43
If above grade floor " " "	.18	.62	1.89	2.44	3.25	4.24	5.41
(If double doors, one-half charges.)							
PARTY WALL with deficiencies not over 24 cents under 40 or 41.	.06	.20	.54	.96	1.50	2.16	2.94
PARTY WALL if deficiencies exceed 24 cents under 40 and 41, or if, any portion of wall is less than 12 inches thick.	.09	.36	.81	1.44	2.25	3.24	4.41

TABLE C. UNPROTECTED RISKS—SEPARATED.

(*not within* 500 *feet of hydrants.*)

BRICK BUILDINGS BY BRICK BUILDINGS WITH OPENINGS.

Exposure Distance or Separating Space.	Rate of Exposure 100 cents	Rate of Exposure 200 cents	Rate of Exposure 300 cents	Rate of Exposure 400 cents	Rate of Exposure 500 cents	Rate of Exposure 600 cents	Rate of Exposure 700 cents
	AMOUNT TO BE ADDED FOR EXPOSURE.						
10 feet.	.22 cts	.44 cts	.66 cts	.88 cts	1.10cts	1.32cts	1.54cts
20 "	.20 "	.40 "	.60 "	.80 "	1.00 "	1.20 "	1.40 "
30 "	.18 "	.36 "	.54 "	.72 "	.90 "	1.08 "	1.26 "
40 "	.16 "	.32 "	.48 "	.64 "	.80 "	.96 "	1.12 "
50 "	.14 "	.28 "	.42 "	.56 "	.70 "	.84 "	.98 "
60 "	.12 "	.24 "	.36 "	.48 "	.60 "	.72 "	.84 "
70 "	.10 "	.20 "	.30 "	.40 "	.50 "	.60 "	.70 "
80 "	.08 "	.16 "	.24 "	.32 "	.40 "	.48 "	.56 "
90 "	.06 "	.12 "	.18 "	.24 "	.30 "	.36 "	.42 "
100 "	.04 "	.08 "	.12 "	.16 "	.20 "	.24 "	.28 "
110 "	.02 "	.04 "	.06 "	.08 "	.10 "	.12 "	.14 "
120 "	.00 "	.00 "	.00 "	.00 "	.00 "	.00 "	.00 "

If the rate be less than 1 %, *reduce pro-rata.*

RULE: **If the rate of the exposure does not exceed that of the risk** *by more than* 50 *cents, add the amount named in the above table, C, for the given distance.*

If the rate of the exposure exceeds that of the risk *by more than* 50 *cents, add the amount named in the above table for so much of the rate of the exposure as equals the rate of the risk itself, and also the amount for the given distance in the following table for such amount as the exposure exceeds that of the risk.*

For example, if a 2 % risk exposes a 1 % risk at 20 feet, the amount named for 1 % in the above table opposite 20 feet is 20 cents, and in Table D below for 100 cents excess is 10 cents, making a total of 30 cents.

IF RISK HAS BLANK WALL toward exposure deduct two-thirds amounts named in Tables. If risk has openings, but EXPOSURE HAS BLANK WALL toward risk, deduct one-third amounts named in the Tables.

IF BOTH WALLS BLANK, deduct three-fourths amount named in Tables.

IF OPENINGS NOT OPPOSITE each other, deduct 30 %. If openings on grade floor only, deduct 25 %.

For FIRE SHUTTERS to the risk deduct 50 % of charge
" " " exposure " 30 % "
" " " both risk and
exposure deduct 60 % "

If intervening distance exceeds 40 feet increase the percentage of deduction by 1 % for each foot that the distance exceeds 40 feet, not exceeding a total deduction of 90 %.

TABLE D. EXCESS OF EXPOSURE RATE.

Exposure Distance or Separating Space.	Add for 100cents excess	Add for 200 cents excess	Add for 300 cents excess	Add for 400 cents excess	Add for 500 cents excess	Add for 600 cents excess	Add for 700 cents excess
10 feet.	.11 cts	.44 cts	.99 cts	1.74cts	2.75 cts	3.96cts	5.39cts
20 "	.10 "	.40 "	.90 "	1.60 "	2.50 "	3.60 "	4 90 "
30 "	.09 "	.36 "	.81 "	1.44 "	2.25 "	3.24 "	4.41 "
40 "	.08 "	.32 "	.72 "	1.18 "	2.00 "	2.88 "	3.92 "
50 "	.07 "	.28 "	.63 "	1.12 "	1.75 "	2.52 "	3.43 "
60 "	.06 "	.24 "	.54 "	.96 "	1.50 "	2.16 "	2.94 "
70 "	.05 "	.20 "	.45 "	.80 "	1.25 "	1.80 "	2.45 "
80 "	.04 "	.16 "	.36 "	.64 "	1.00 "	1.44 "	1.96 "
90 "	.03 "	.12 "	.27 "	.48 "	.75 "	1.08 "	1.47 "
100 "	.02 "	.08 "	.18 "	.32 "	.50 "	.72 "	.98 "
110 "	.01 "	.04 "	.09 "	.16 "	.25 "	.36 "	.49 "
120 "	.00 "	.00 "	.00 "	.00 "	.00 "	.00 "	.00 "

TABLE F. UNPROTECTED RISKS—ADJOINING

BUILDINGS ADJOINING.*	Rate of Exp're 100 cts	Rate of Exp're 200 cts	Rate of Exp're 300 cts	Rate of Exp're 400 cts	Rate of Exp're 500 cts	Rate of Exp're 600 cts	Rate of Exp're 700 cts
	AMOUNT TO BE ADDED FOR EXPOSURE.						
	cents	cents	cents	cents	cents	cents	cents
WALLS NOT DEFICIENT exceeding 10 cents under Nos. 38 or 39.	.03	.06	.18	.32	.40	.48	.56
WALLS DEFICIENT exceeding 10 cents under 38 or 39.	.10	.20	.30	.40	.50	.60	.70
If one wall deficient one-half chg.	.05	.10	.15	.20	.25	.30	.35
WALL HIGHER and openings in excess height, on higher building.	.10	.32	.48	.64	.80	.96	1.12
Charge on lower building.	.06	.12	.18	.24	.30	.36	.42
B'D'GS COMMUNICATING on the grade floor with single fire door.	.10	.20	.54	.72	.90	1.08	1.26
If above grade floor " " "	.15	.36	.66	.88	1.10	1.32	1.54
(If double doors, one-half charges.) N. B. No deduction for Fire-Doors, if exposure be an Oil or "Grease" risk—rate as one hazard.							
PARTY WALL with deficiencies not over 24 cents under 40 or 41.	.04	.08	.30	.40	.50	.60	.70
PARTY WALL if deficiencies exceed 24 cents under 40 and 41, or if, any portion of wall is less than 12 inches thick.	.12	.24	.36	.48	.60	.72	.84

WALL LONGER OR SHORTER, openings being at right angles, charge one-fourth of what would be charge for distance between nearest openings by tables A and B.

* *Where the Occupancy Table first column charge of the adjoining exposure exceeds that of the risk, add one-sixth of the excess to above charges unless the separating walls are independent, without communications and carried above roof.*

RULE: **If the rate of the exposure does not exceed that of the risk** *by more than* 50 *cents, add the amount named in the above table.*

If the rate of the exposure exceeds that of the risk *by more than* 50 *cents, add the amount named in the above table for so much of the rate of the exposure as equals the rate of the risk itself, and also the amount for the deficiency in the following table for such amount as the exposure exceeds that of the risk.*

BUILDINGS ADJOINING.	Add for 100 cts excess	Add for 200 cts excess	Add for 300 cts excess	Add for 400 cts excess	Add for 500 cts excess	Add for 600 cts excess	Add for 700 cts excess
	ADD TO ABOVE FOR EXCESS OF EXPOSURE RATE.						
	cents	cents	cents	cents	cents	cents	cents
WALLS NOT DEFICIENT exceeding 10 cents under Nos. 38 or 39.	.04	.20	.54	.96	1.50	2.16	2.94
WALLS DEFICIENT exceeding 10 cents under 38 or 39.	.10	.40	.90	1.60	2.50	3.60	4.90
If one wall deficient one-half chg.	.06	.20	.45	.80	1.25	1.80	2.45
WALL HIGHER and openings in excess height charge on higher building.	.10	.36	.72	1.18	2.00	2.88	3.92
Charge on lower building.	.03	.12	.18	.24	.30	.36	.42
B'D'GS COMMUNICATING on the grade floor with single fire door.	.09	.36	.81	2.44	3.25	4.24	5.41
If above grade floor " " "	.27	.98	2.43	2.74	3.75	4.96	6.39
(If double doors, one-half charges.)							
PARTY WALL with deficiencies not over 24 cents under 40 or 41.	.07	.25	.72	1.18	2.00	2.88	3.92
PARTY WALL if deficiencies exceed 24 cents under 40 and 41, or if, any portion of wall is less than 12 inches thick.	.11	.44	.99	1.74	2.75	3.96	5.39

NATIONAL BOARD RULES FOR THE CONSTRUCTION OF FIRE DOORS AND SHUTTERS.

(The following are the rules and requirements of The National Board of Fire Underwriters. By writing to the Company or to the General Agent of the National Board at New York, they may be secured in pamphlet form.)

CLASS A.

Rules for the Construction of Standard Tin-Clad Fire Doors.

1. Openings in Wall. To be as few and made as small as the nature of the business will permit. Walls to present smooth masonry surface without any wood trimming.

2. Sills. **a.** To be of stone, built into wall at least six inches at each end, and extended under and flush with outer surface of door. (See Figs 1 and 3.) or,

b. To be of wrought iron or steel plate not less than ¼ inch in thickness, on brick, stone or concrete support, built into wall at least six inches at each end and extended under and flush with outer surface of door. (See Fig. 2.) or,

c. To be of concrete placed between suitable angle irons and made flush with their upper surfaces. This angle iron to be placed on each side of the wall, to be not less than ⅜ inch in thickness, to have faces of equal width, to extend six inches beyond the opening at each end, to be held in place by ¾-inch bolts run through the wall and to have its horizontal face extend under and its edge flush with the outer surface of the door. (See Fig. 4.)

It is of particular importance that the workmanship be first class when the plate or angle iron sills are used. No wood or other combustible material to be laid over any sill.

3. Lintel. Preferably to be brick arch, but subject to the approval of the Underwriters having jurisdiction. Stone or tin-clad wood lintels not approved.

4. Size and Shape of Door. **a.** Sliding doors to overlap sides and top of opening four inches. Top of door to conform to incline of rail, ¾ inch to one foot.

b. Swinging doors to shut into a brick rabbet in wall or into a 2½x2½ x¼-inch angle iron rabbet secured on each side with ¾-inch bolts through the wall, or into an approved door frame of iron. (See Fig. 5.)

5. Wood-Work. **a.** Stock to be sound, well seasoned white pine, or

similar non-resinous wood, dressed, tongued and grooved boards not over six inches in width.

Wood containing sap, pitch or moisture of any kind is liable when heated, to generate gas, which, if confined under the tin casing, may gather sufficient force to burst open the covering, thus exposing the wood-work to fire and rendering the whole door liable to destruction; for this reason, only clear dry stock should be used.

b. The thickness of the door required in each case to be determined by the Underwriters having jurisdiction. When door is placed on one side of wall only, it shall be not less than 2½ inches in thickness; when doors are placed on both sides of wall, each door shall be not less than 2 inches in thickness.

c. When the door is to be 2½ inches thick, three equal thicknesses of boards to be used the outside layers to be vertical and the inner layer horizontal. (See Fig. 6.)

d. A 2-inch thick door to be made of two thicknesses of one-inch boards, one layer to be vertical and the other diagonal or at right angles. (See Fig. 7.)

e. Layers to be securely fastened together by wrought iron clinch nails driven in flush and clinched so as to leave smooth surfaces on both sides of the door. (See Fig. 8.)

f. Care should be taken to have all edges and corners smooth and square.

6. Tin Covering. *The fire-resisting value of a wood door encased in tin depends upon the exclusion of oxygen from the wood, thereby retarding or preventing combustion. To obtain this result the tin must be so applied that during exposure to fire the tin will neither leave the door nor will any joints or seams buckle open by expansion so as to expose the wood. In covering the door follow carefully every specification given below:*

a. Use tin plates 14x20 inches, "IC" charcoal, 108 lbs. to the box.

The best grade is cheapest in the end. Never use zinc to cover a fire door. Use no solder.

b. When the door is to be exposed to dampness "terne" plates should be used.

c. All joints should be locked ½ inch and nailed *under seams* (except on edge of door) as illustrated. (See Figs. 9, 10, 11, 12, 13 and 14.)

d. Cover four corners first. For each corner of door use a whole sheet of tin without cutting, making a mitre fold instead of a mitre joint or seam, driving two nails under each fold. (See Figs. 15, 16, 17 and 18.)

e. Next cover the edges with sheets of the same size (or long strips, if preferred) and lock into corner pieces with a joint like Fig. 14, but without nail. (See Fig. 19.)

f. Then apply side sheets, starting with first sheet at right hand lower corner; (See Figs. 19*a* and 19*b*.) then all horizontal seams when completed will be like Fig. 14, except the last seam at the top of door, which will be like Fig. 12. All vertical seams will be like Fig. 12.

g. Complete the tinning of one side before beginning the other. (See Fig. 20.

h. Nails to be barbed 1½ inches long for 2½-inch doors, and 1¼ inches long for 2-inch doors, flat heads. Use five nails on each side and four nails on each end of each sheet.

i. Care should be taken to have sheets as flat against door as possible in order to avoid air spaces.

7. Hardware for Sliding Doors. *Complete the tinning before attaching any hardware.* (*See Rule No. 9.*)

a. *Track.* To be of best quality flat rolled steel, ⅜-inch thick by 3½ inches wide and bolted every 2½ feet with ¾-inch bolts running through the wall, having nut and flanged washer on the opposite side.

b. *Hangers.* To be of wrought metal, ⅜x3½ inches, and attached by ½-inch bolts. Wheel to have not less than 1½-inch bearing on axle, roller bearing preferred, and to be of malleable or wrought iron. (See Fig. 21.)

c. The long end of hanger to be not less than 18 inches, and to be drilled for not less than two ½-inch carriage bolts. For doors less than 6 feet wide two hangers are sufficient; for doors over 6 feet wide, three hangers to be used.

d. *Binders.* Wrought iron binders ⅜-inch x 3½ inches, drilled for ¾-inch bolts. Each binder to have an angle flange at back end, 1 inch deep to notch in wall, or to have two bolts, to prevent sagging. Two binders are required, one at side near floor, and one at same side near top, into both of which the door closes. (See Fig. 22.) A roller guide to be located near bottom of door at opposite side from binder stops. Guide to be of wrought metal, ½ x 2 inches, the base to be U shape, countersunk in floor and wall and bolted to wall. (See Fig. 23.)

e. *Chafing Strips.* One strip of 1-inch half-round iron to be screwed to door on side next wall, located one-third the distance from bottom to top of door, parallel to door track. Ends to be six inches from side of door. (See Fig. 24.) A flat piece of metal to be attached to front of door to take the wear of roller guide. Strips to be screwed to door and heads of screws to be countersunk. (See Fig. 25.)

f. *Handles.* Two required. One large, heavy wrought iron, bow-shaped handle to be bolted to front of door. (See Fig. 25.) One on back to be countersunk flush with surface of door. (See Fig. 24.) The two may be attached by the same through bolt.

g. *Bumper Shoes.* Two made of $\frac{1}{16}$ - inch plate iron, placed on door where it strikes the binders in closing. (See Figs. 24 and 25.)

h. *Weight.* Should be flat and slightly in excess of weight required to balance door.

i. *Weight Cord.* To be hard plaited, not twisted.

j. *Fusible Links.* Which will fuse at 160 degrees F., to be applied in a manner subject to the approval of the Underwriters having jurisdiction.

8. Hardware for Swinging Doors. (*See Rule No. 9.*)

a. *Wall Eyes.* Wrought iron, for ¾ inch pin, built in wall or bolted

through wall with $\frac{3}{4}$-inch bolt, with $\frac{3}{16}$-inch iron washer each side. Bolts should always be put through brick work far enough from edge of opening to prevent weight of door loosening the masonry. (See Fig. 28.)

b. *Hinge.* Wrought iron, $\frac{3}{8}$-inch x $2\frac{1}{2}$ inches, bolted to door with four $\frac{3}{8}$-inch bolts, hinge to extend three-quarter way across door. (See Figs. 27, 28 and 29.)

c. *Latch.* Wrought iron, $\frac{3}{8}$ inch x 2 inches, bolted to door with $\frac{3}{8}$ inch bolts. Keeper to be wrought iron and also bolted to door. (See Fig. 30.)

d. *Catch.* Heavy wrought iron built in wall or bolted through. (See Fig. 30.)

9. Fastening Hardware to Doors. All wrought iron sheaves, hinges and latches to be secured by bolts passing through door, the head of bolt resting against a washer next to the tin, the nuts being against the wrought iron. Do not use screws to attach any hardware except chafing strips, bumpers and automatic attachment.

Do not use builders' ordinary cast iron hardware. Use only best quality of bolts.

10. Approved Door Frame of Iron. *(See Fig. 5.)*

a. *Jambs.* To be made of rabbetted $2\frac{1}{2}$-inch angle iron $\frac{1}{4}$-inch thick and held firmly in place by at least three $\frac{3}{4}$-inch bolts each side, passing through wall.

b. *Metal Sill.* *(See Rule No. 2 b.)* To be well secured to the iron frame.

c. Catches for latches, also the pin blocks to receive the hinges, to be of heavy wrought iron and properly riveted to the iron frames.

11. Setting up or Hanging of Doors. *Do not hang door from wood frame even if frame is tin-clad. Do not plug the wall with wood or lead to which to fasten door or shutter supports. Do not use screws of any kind to hang the door.*

a. *Sliding Door.* Stand door on sill in its proper position when closed, and slip under door a strip of wood $\frac{1}{4}$-inch thick. Bolt the track in place at an incline of $\frac{3}{4}$ of an inch to the foot. Distance between the top of door and bottom of track should not exceed $\frac{1}{4}$ of an inch. Place the hangers on the track and mark location of bolt holes on the door, locating hangers over track bolts. Bore holes *exactly where marked* and then bolt hangers to door. Care should be taken to prevent sagging of door so it will not chafe on sill when it closes.

Next apply trimmings to door and adjust binders and catch, then the automatic appliances.

When necessary, a light framework of slats should be built outside of sliding doors to prevent piling of stock, etc., against them.

b. *Swinging Door.* In locating holes for the hinges, the front of door should be raised a little higher to avoid sagging against floor; otherwise follow directions for sliding door.

12. Vertical Door. *Arranged to avoid accidents.* (*See Fig. 31.*) **a.** Under special conditions where swinging or horizontally sliding doors cannot be used an automatic vertical door may be arranged. (See Fig. 31.)

b. The construction of the door proper to be the same as that of other fire doors, but special hangers and trimmings are necessary.

c. Malleable or wrought iron wheels to be used.

d. The cord connecting with fusible link is attached to lower part of door passing over its proper pulley to the left and supporting the smaller weight. The heavier weight is permanently connected by a wire cable to the upper loop at top of door, and is adjusted to prevent the sudden dropping of the door, but allowing it to close when link fuses.

13. Painting. Bright tin fire doors resist fire better than if painted. Do not paint the doors unless it is necessary and not until they have first been given a coat of asphaltum. A light colored paint does not absorb heat so readily as dark colored paint.

14. Care and Maintenance. **a.** Fire doors should be ready for instant use at all times, therefore it is necessary to keep the surroundings clear of everything that would be likely to obstruct or interfere with their free operation. They should be kept closed and fastened at night and on Sundays and holidays, and whenever the openings are not in use.

b. Never tack any tin on a tin-clad door. When tin becomes worn substitute new sheets in the same manner as when covering a new door.

15. Placard. NOTICE—Watchman will please see that this door is kept closed at night and when factory is shut down, and that it is in perfect working order.

CLASS B.

Rules for the Construction of Standard Tin-Clad Fire Shutters.

16. Tin-Clad Fire Shutters. (*See Fig. 32.*) **a.** To be hung next to masonry, either overlapping window opening 4 inches or fitting close inside opening.

b. Construction to be same as for fire doors except that only two thicknesses of ⅞-inch boards are required, layers of boards to be at right angles.

c. When made in pairs, the edges coming together should be flush (not rabbeted.)

d. Tin covering to be the same as for fire doors except that seams should be made with the upper sheet lapping outside of under one so as to shed water.

e. Hinges to be wrought iron $\frac{5}{16}$-inch x 1¾ inches. Same to be secured by bolts passing through shutter with washers under bolt heads.

f. Substantial wrought iron pin or eye blocks to be securely set in wall or bolted through wall.

g. Shutters to be secured shut by an iron bar ⅜-inch x 1½ inches, same to

be bolted through shutter and at least one in three on each floor above the first to be constructed so that it can be operated from both inside and outside. Catches to be bolted to shutter

h. When sliding shutters are used outside (should not be if avoidable,) metal shields should be provided to prevent accumulation of snow or ice on the track.

17. Painting. A light colored paint is recommended for fire shutters but first give them a coat of asphaltum. (See Rule No. 13.)

18. Care and Maintenance. **a.** Fire shutters should be ready for instant use at all times, therefore it is necessary to keep the surroundings clear of everything that would be likely to obstruct or interfere with their free operation. They should be kept closed and fastened nights, Sundays and holidays, and whenever the openings are not in use.

b. Never tack any tin on a tin-clad shutter. When tin becomes worn substitute new sheets in the same manner as when covering a new shutter.

Class C.

Rules for the Construction of Special Fire Doors for Necessary Shaft and Belt Openings in Fire Walls.

19. Shaft Openings. *Special device for preventing spread of fire through necessary shaft openings in fire walls (See Fig. 35.)*

a. To be made of two thicknesses of 7/8-inch narrow, matched, thoroughly seasoned boards, put together at right angles and securely nailed with wrought iron clinch nails. (See Rule 5.)

b. To be covered with heavy tin plates, locked joints, nailed under seams, as per specifications for Tin-clad Fire Doors. (See Rule 6.)

c. To be hinged to single stud bolt in wall and retained at bottom by proper reverse angle iron securely bolted to the wall.

20. Belt Openings. *Double door to protect belt-openings through wall. (See Fig. 33.)*

a. To be made of two thicknesses of 7/8-inch boards. Otherwise follow specifications in rule 5, and, so far as possible, in rule 6 of specifications for Tin-clad Fire Doors.

b. To be provided with two suitable hooks and staples for holding doors closed.

c. To slide in upper and lower guard rails or channels retaining the doors in place. Channels to be made of 2¼x2¼x¼-inch angle irons securely riveted together and secured by ¾-inch bolts through the wall. Z bars of proper dimensions may be used if obtainable. Channels to be long enough to retain doors when open.

d. A metal hood constructed as shown in Fig. 34 may be used if securely

fastened to the wall. Hoods should be constructed of heavy galvanized iron, without the use of solder.

Metal hoods are inferior to the double doors and should be used only when the doors are not practicable.

Class D.

Rules for the Construction of Automatic Trap Doors for Stairways and Stairway Enclosures.

21. Automatic Trap Doors for Stairways. *Occasionally it is necessary to have an open stairway, and in such cases an automatic trap-door. (See Figs. 36 and 37.)*

a. If the floor is not more than 1¼ inches thick, the door shall be made of 1¼-inch sound, well seasoned, narrow, matched boards, with battens screwed on.

b. If the floor is more than 1¼ inches thick, the door shall be as just described, and shall have standard lock-jointed tin covering as required for fire doors, on the under side, the tin extended over the edges and nailed on the upper side of the door.

c. Hinges to be of heavy wrought metal with straps extending well onto the door.

d. To be balanced with a weight on a cord running over double pulley on wall, a fusible link being inserted at point where cord is fastened to the door, so that door will close automatically in the event of fire.

If door is heavy it should have a balance weight attached by wire cable to prevent accident, and a gravity catch to hold the door when closed. (See Vertical Fire Door Specifications, also Fig. 36.)

e. To be provided with a wrought metal bow high enough to form a stop which will prevent the door being raised to a vertical line, thus keeping it in such position that it is sure to drop when link melts. Bow to be securely fastened to the upper side of the door so that it will serve as a handle. (See Fig. 37.)

22. Stairway Enclosures. *(See Figs. 38 and 39.) (Buildings of ordinary construction.)*

a. Stairways to have separate enclosure for each flight, not less than 1½ inches thick, made tight and kept in repair. If approved fire-proof material is not used, enclosure to be made of two thicknesses of matched boards, or of tongued and grooved or splined planks.

Double boarding is preferable to single planking, as it is not so liable to warp and open up at the seams.

b. To be provided with a door at each flight, preferably at bottom.

c. Doors to be not less than 1½ inches thick and unless standard iron or tin-clad, to be constructed of two thicknesses of matched boards or of tongued and grooved or splined planks. Heavy wrought iron hinges, latches and catches to be attached by bolts.

d. Doors to be kept closed and latched when not in use. It is preferable to attach a stout spiral spring to all doors to keep same closed automatically and doors which are kept open during working hours to be held so by a hook attached to a fusible link located as high on door as convenient. (See Fig. 38.)

e. Glass windows if needed in stairway enclosure or door, to be fixed (not swinging) and of approved wired glass properly set.

23. Stairway Enclosures. (*Buildings of fire-proof or mill construction.*)

Stair openings in buildings of such construction not "cut off" in fire proof shafts are a violation of a most prominent principle of such construction.

When they exist, however, they should be enclosed by fire-proof material under special specifications.

Class E.

Rules for the Construction of Automatic Elevator Traps.

24. Automatic Elevator Traps. **a.** Open elevator shafts and hatchways shall be provided at each floor opening with a trap door which opens and closes as the elevator passes.

b. If the floor is of ordinary construction, or not more than 1¼-inch thick, the trap door shall be made of 1¼ inch sound, well seasoned, narrow, matched boards with battens screwed on.

c. If the floor is of mill construction, or more than 1¼ inches thick, the trap door shall be as just described and shall have standard lock-jointed tin covering, as required for fire doors, on the under side, the tin extended over all edges including hole, if any, for cable, and nailed on the upper side of door. The hole for cable, if any, shall be as small as possible.

d. When the trap-door is closed it shall extend beyond the opening on all sides.

e. Elevator left at a landing shall not be accepted in lieu of a trap door.

A trap opened and closed by the moving elevator is regarded as distinctly superior to other devices and should be generally used. However, if not employed, owing to high speed of elevator or other cause, automatic traps should be placed at each floor. They should be constructed as above, secured by stout wrought iron hardware attached by bolts; be held open by a fusible link located on shaft side of door; be actuated from behind by heavy spring which upon fusing of the link will push trap beyond a vertical position so it will close by gravity; and be kept closed except during working hours.

Class F.

Rules for the Construction of Standard Iron Doors, Vault Pattern.

The following specifications are for doors covering openings not to exceed fifty square feet in area. Doors for larger openings require special treatment.

25. Doors.

To be placed on each side of opening in fire wall.

26. Sills. **a.** To be of iron or steel and raised not less than two inches above the floor on each side of the wall. (See Figs. 40 and 42.)

b. If of plate iron or steel, the edges to be securely fastened to $1\frac{1}{2}$ x $1\frac{1}{2}$ x $\frac{1}{4}$ inch angle iron, or heavier, on the inner side of the wall frame. (See Fig. 49.) In all cases the sill to rest substantially on the solid brick wall, and to extend to the upper edges of the wall frame.

27. Basement Floor. To be of stone or concrete where the doors are to swing. In no case to be of wood unless the doors swing clear of floor at least six inches.

28. Wall Frame. **a.** To be made of 4 x 3 x $\frac{3}{8}$-inch angle iron, (See Figs. 40 and 41) or of 4 x $\frac{3}{8}$-inch bar iron stiffened by $1\frac{1}{2}$ x $1\frac{1}{2}$ x $\frac{1}{4}$-inch angle iron riveted on the back. The latter frame is more suitable for flush doors. (See Fig. 42.)

b. The bottom pieces of frame to project two inches above floor. (See Fig. 42.)

Where the sliding door is used, the bottom pieces of the wall frame may consist of the angle irons forming the lower channels. (See Fig. 49.)

c. Each set of wall frames to be connected by bars of $1\frac{1}{4}$ x $\frac{1}{4}$-inch iron spaced not over 24 inches apart all around, except where sill acts in place of bars, (See Figs. 40 and 41) or by $\frac{5}{8}$-inch bolts through the wall and spaced not over 24 inches apart. (See Fig. 42.)

Connections of $1\frac{1}{2}$ x $1\frac{1}{2}$ x $\frac{1}{4}$-inch angle iron in the upper corners can be used to advantage when the angle iron wall frame is used. (See Figs. 40 and 41.)

d. Top and bottom pieces of wall frame to be joined to side pieces by wide splice plates of $\frac{3}{8}$-inch iron securely riveted in place. (See Fig. 41.)

29. Door Plates. **a.** To be of $\frac{3}{16}$-inch iron or steel thoroughly straightened. Single plates to be used where practicable.

b. To overlap wall frame at least one inch on all sides; or if doors are flush, to shut into at least $\frac{5}{8}$-inch rabbet all around, formed by angle on back of wall frame.

c. To be securely riveted to the panel frame and panel bars. (See Rule 31.)

d. Where two plates are used the joint to be reinforced by 3 x $\frac{3}{16}$-inch strip or splice plate securely riveted to each plate. Rivets on splice plate to be staggered and not to exceed 9 inches apart on each plate.

30. Panel Frame. *(See Figs. 43 and 44.)*

a. To be made of 2 x 2 x $\frac{3}{8}$-inch angle iron, continuous with bent corners or with corners reinforced by fillet angles where joined. Fillet angles to be securely riveted in place.

b. To be stiffened with 2 x 2 x $\frac{3}{8}$-inch angle iron panel bars with ends off-set so as to extend over sides of frame, or ends may be fastened with fillet angles.

c. Each frame to be provided with at least two panel bars and where doors exceed seven (7) feet in height panel bars not to exceed two feet apart.

d. To be placed as near the edges of the door plate as practicable.

31. Riveting. Rivets to be of Norway iron, at least $\frac{3}{8}$ of an inch in diameter and spaced not over six inches apart. Steel rivets should not be used.

As the fire resisting qualities of the iron door depends largely on proper riveting, the rivets should be properly placed and carefully drawn up.

32. Hinges. (*See Figs. 40, 42, 45 and 46.*)

a. Doors to be hung to wall frame by at least three wrought iron hinges, care being taken to install them in exact alignment.

b. Hinges riveted to wall frame to be at least 4 x 3 inches and made of ⅜-inch iron or heavier. To be fastened by at least three ⅜-inch rivets.

c. Hinges on door to be constructed of 2 x ⅜-inch bar iron bent to overlap the panel frame on the hinge side. Upper and lower hinges to extend across the door to panel frame on opposite side. Center hinge to extend at least one-half of the distance across the door. To be securely riveted to door plate and through panel frame on each side.

d. Pins to be of ⅝-inch turned steel.

33. Lever Bars. (*See Figs. 46 and 47.*)

a. Doors to be secured by at least three lever bars of 1½ x ⅜-inch iron, working together. Upper and lower lever bars not to exceed twelve inches from upper and lower edges of door opening.

b. To be operated from either side of door, to swing freely on ⅜-inch pin or rivet, to be provided with proper keepers securely riveted on outside of door and with proper spring to insure latching.

c. To freely enter catches made of ½-inch Norway iron securely riveted through the wall frame.

34. Double Swinging Doors in Pairs. (*See Fig. 47.*)

Double swinging doors in pairs refer to a pair of doors on each side of the fire wall.

a. Construction to conform generally to foregoing rules.

b. To have two opposite doors fastened together by hooks of ⅝-inch round iron, bolts or spring catches at top and bottom.

c. Right hand door to fold over left hand door lapping at least one inch, or, where the doors are flush, to fold into rabbet of at least ⅝ of an inch.

d. Catches to be of ½-inch Norway iron securely riveted through door plate and angle iron panel frame.

35. Sliding Doors. *Not self-closing.* (*See Figs. 48 to 51.*)

a. Construction to conform generally to rules for Swinging Doors.

b. Panel frames to be placed at extreme edge of door plates.

c. To slide in channels at the top and bottom. Bottom channel to be formed by two angle bars 2½ x ⅜ and 1½ x ¼ inches. Top channel to be formed by two angle bars 2 x ⅜ and 1½ x ¼ inches. Channels to be securely riveted or bolted to the wall frame, and where they extend beyond the wall frame, to be firmly bolted to the wall by expansion bolts (½ x 4½ in.) The lower channel to extend beyond the wall frame at least twelve inches on the side toward which the door opens.

d. To lap wall frame at least two inches at the sides and at least one inch at the top and bottom.

e. To be secured both in front and back by at least two lugs or binders on each side, made of $\frac{7}{8}$-inch round iron passing through holes in the angle iron panel frame when the door is closed. Lugs to be so arranged that they will bind door to the wall frame when it is closed and latched. Lugs to be securely riveted or bolted to the wall frame and in such manner as to prevent turning. (See Figs. 50 and 51.)

f. Hangers to be of the anti-friction pattern and securely fastened to the door plate by at least four one-half inch machine bolts at each fastening. At least two hangers to be placed on each door. (See Figs. 48 and 49.)

g. Wheels to be of cast iron $\frac{3}{4}$ x $4\frac{1}{2}$ inches, and may be constructed with curved grooves so as to bear only on each edge of the $\frac{1}{2}$-inch track. (See Fig. 49.)

h. Track to be without incline, of $\frac{1}{2}$ x $1\frac{1}{2}$-inch iron securely riveted on the upper side of the angle iron channel and to be perfectly true and without obstruction to wheels. (See Fig. 49.)

i. Doors to be provided with a latch formed of 2 x $\frac{3}{8}$-inch iron to which the handle is fastened. (See Fig. 51.)

j. When necessary a light frame-work of slats should be built outside of sliding doors to prevent piling of stock, etc., against them.

36. Automatic Sliding Doors. **a.** The fusible link to be so arranged that when it gives way under heat a sufficient excess in weight will be exerted to pull and latch the door closed.

b. The cord on the latch side to be of flexible phosphor bronze, securely attached to the door. The cord to which the link is attached may be of the usual form if desired. Link to be so placed as always to be in door opening.

c. The cord sheaves to be securely fastened to the wall with expansion bolts, to be provided with bronze bearings, and so constructed that the cord cannot jump the groove.

d. The weight on the side toward which the door closes to be inclosed in a suitable box to prevent molestation.

e. Latch to be provided with a suitable coiled spring for holding it in place and to insure fastening.

37. Automatic Swinging Doors. Require a different arrangement of the link and weights closing the doors. Weights to be properly boxed and placed between doors. Cords to pass through holes drilled in wall frame and to be so arranged in sheaves that the fusing of the link will release sufficient weight to pull and latch the door closed. Fusible links to be placed near the ceiling and arranged so that the fusing of the link on either side of the wall will operate both doors. Several links may be placed on either side if desired. The cords closing doors should be sufficiently weighted to keep them taut when the doors are opened and closed.

38. Automatic Swinging Doors in Pairs. To be so arranged that the right hand doors will fold over left hand doors. This requires an automatic stop or trigger at the top of the doors which will hold the right hand door sufficiently open to allow the lef hand door to close first. The closing of the left hand door releases the trigger and allows the remaining door to close.

The left hand door to be provided with spring bolts or latches at both top and bottom. These to be operated from either side of the door by proper handles at the center.

39. Standard Sheet Iron Doors. These doors are lighter than the vault doors and differ from them in the following particulars:

a. No. 12 gage sheet iron or steel is used instead of $\frac{3}{16}$-inch plate.

b. Panel frames and bars are made of 2 x 2 x ¼-inch angle iron instead of 2 x 2 x ⅜-inch.

Standard sheet iron doors may be used in less closely built up districts and in localities where exposure is not liable to be severe. They are not recommended.

40. General Notes on Construction. All materials used should be carefully and thoroughly straightened before the door is put together. Scrap or short pieces not to be used where such material should be avoided. Rivets to be drawn tight and all parts thoroughly painted with iron oxide mixed with boiled oil. Doors to be made, finished and hung in a thoroughly workmanlike manner.

41. Setting up Doors. The thickness of the wall should be accurately measured so that the bars or bolts fastening wall frame together can be cut to the exact length. If the door is not installed when the wall is erected, or is not placed in an old opening, the opening should be cut larger than the frame and the jambs built up to the proper size, using cement mortar and thoroughly pointing up around frames.

Frames to be set perfectly level and plumb and doors hung so as to fit the wall frame closely all around. All doors to swing or slide freely and without binding, care being taken to see that the latches or lever bars fasten properly.

42. Care and Maintenance. Fire doors should be ready for instant use at all times, therefore it is necessary to keep the surroundings clear of everything that would be likely to obstruct or interfere with their free operation. They should be kept closed and fastened at night and on Sundays and holidays, and whenever the openings are not in use All parts should be kept thoroughly painted.

43. Placard. NOTICE—Watchman will please see that this door is kept closed at night and when factory is shut down, and that it is in perfect working order.

CLASS G.

Rules for the Construction of Standard Iron Shutters.

44. Standard Iron Shutters. (*See Figs. 52 and 53.*)

a. To be made of No. 14 gage sheet iron or steel and so as to lap the wall at least 1½ inches all around. The bottom of the shutter to fit the sill closely if it is not practical to lap it.

b. Frames to be of 1½ x ¼-inch angle iron with not less than two cross bars

of the same material. Shutters over six feet in height to have cross bars not exceeding two feet apart. Frame to enter wall opening when shutter is closed.

Continuous welded frames and cross-bars of $1\frac{1}{2}$ x $\frac{1}{2}$ inch iron are often used, but are not considered the full equivalent of the angle iron frame. The welded frame is often necessary when folding shutters are used.

c. To have not less than two lever bars of $1\frac{1}{2}$ x $\frac{3}{8}$-inch iron and where over six feet in height lever bars not to exceed two feet apart. Lever bars to work together by $\frac{5}{8}$-inch connecting rod and fasten into substantial lugs riveted on each shutter or to proper fastenings in the brick wall if the shutters are single.

Lever bars to extend at least one-third of the distance across the opposite shutter when double shutters are used.

d. Hinges to be of 2 x $\frac{1}{4}$-inch iron extending at least three-fourths of the way across the shutter. Hinges not to exceed two feet apart, when the shutter is over six feet in height.

e. Pin blocks or shutter eyes to be securely set in brick wall preferably while building. On finished buildings pin blocks or eyes should be firmly set in holes drilled in brick, and fastened with iron wedges and cement. Pins to be of half-inch round iron.

f. Rivets to be of iron at least $\frac{5}{16}$ inch in diameter and spaced not exceeding 6 inches apart.

g. Hooks or gravity catches in wall to be provided to hold shutter in position when open.

h. At least one shutter in three on each floor above the first to be constructed so that it can be operated from the inside and outside. Handles on outside to be so constructed that they can be operated by hand or pike pole:

i. Shutters to be thoroughly painted with two coats of iron oxide and boiled oil or equivalent.

45. Care and Maintenance. Fire shutters should be ready for instant use at all times, therefore it is necessary to keep the surroundings clear of everything that would be likely to obstruct or interfere with their free operation. They should be kept closed and fastened nights, Sundays and holidays, and whenever the openings are not in use. All parts should be kept thoroughly painted.

46. Steel Roll Fire Door and Shutter. Should not be used where Standard fire doors and shutters can be employed. Otherwise for front or rear openings, exposed across narrow streets or alleys, they are recommended, if of improved construction.

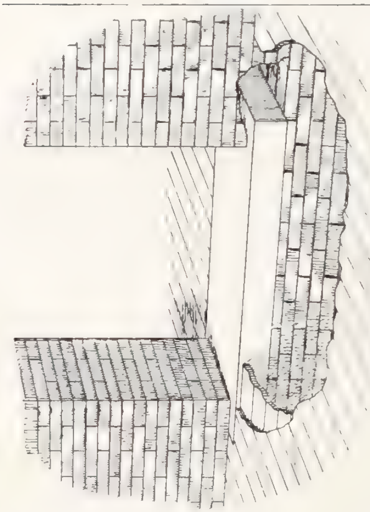


Fig.1 Stone Sill.

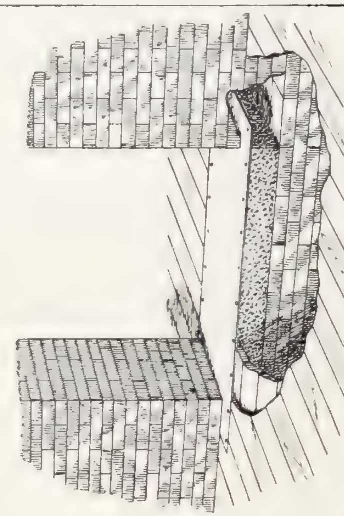


Fig 2. Metal Sill.

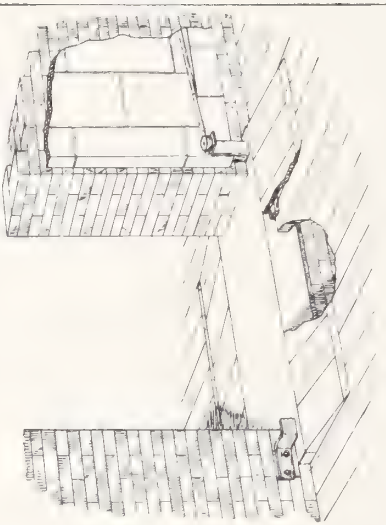


Fig 3 Raised Sill with Inclines

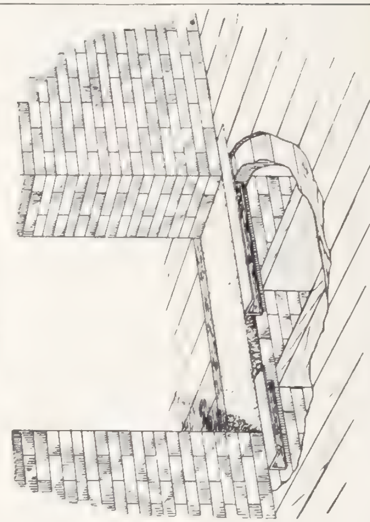


Fig 4 Angle Iron and Concrete Sill.

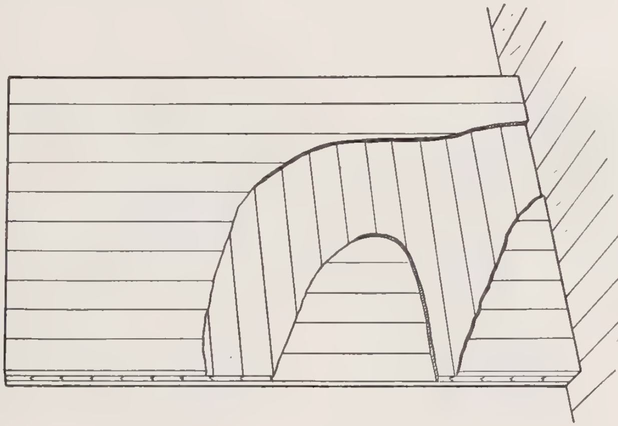


Fig. 6. Method of Constructing $2\frac{1}{2}$-inch Door.

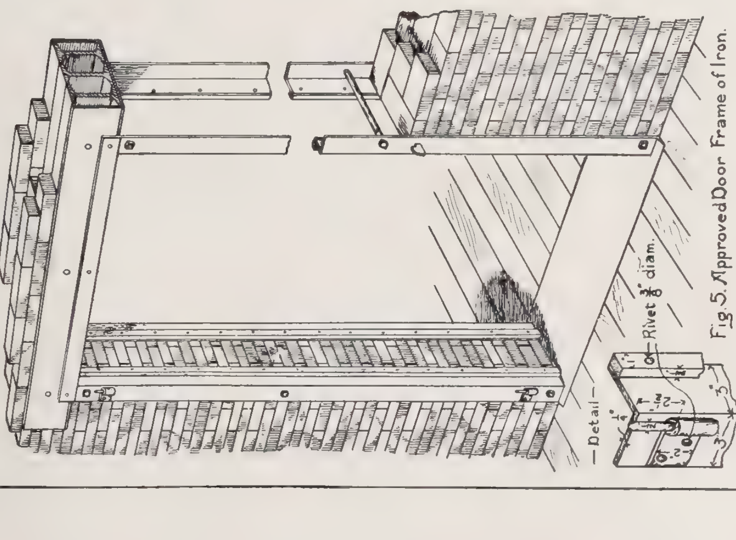


Fig. 5. Approved Door Frame of Iron.

Useful when door openings are made after wall has been erected.

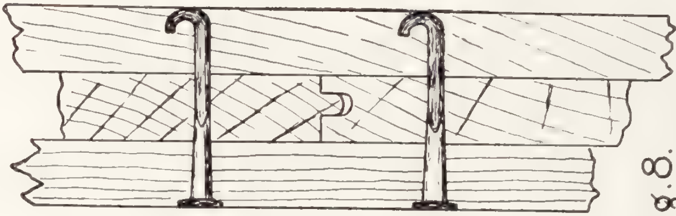


Fig. 8. Clinch Nailing.

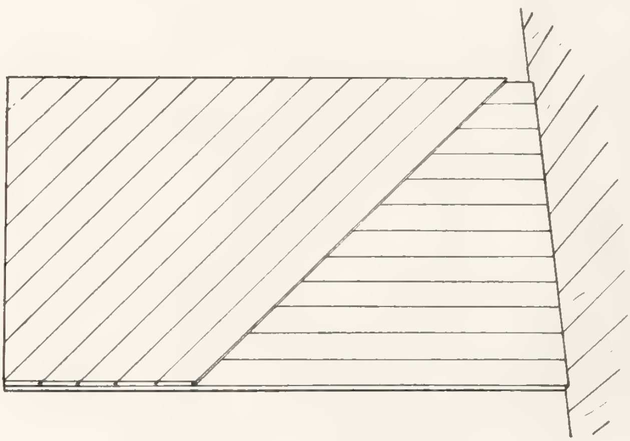


Fig. 7. Method of Constructing 2-inch Door or Shutter.

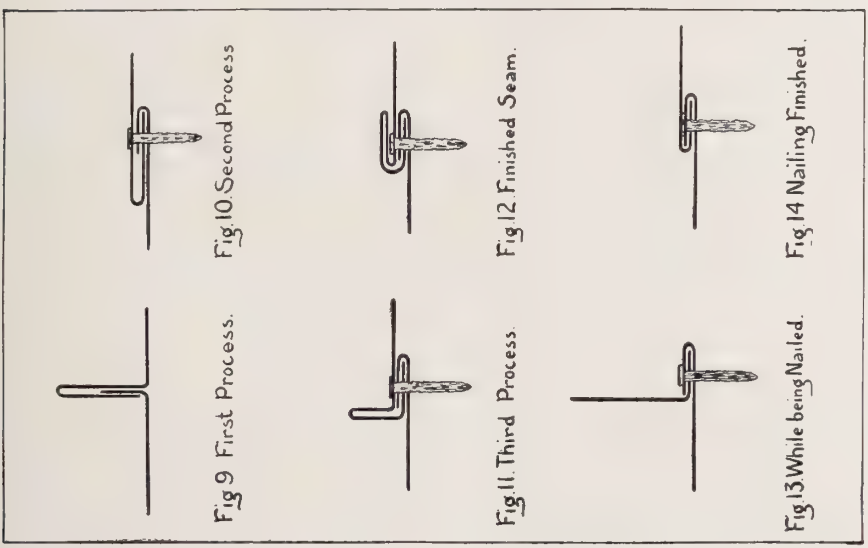


Fig 9 First Process. Fig.10. Second Process

Fig.11. Third Process. Fig.12. Finished Seam.

Fig.13 While being Nailed. Fig.14 Nailing Finished.

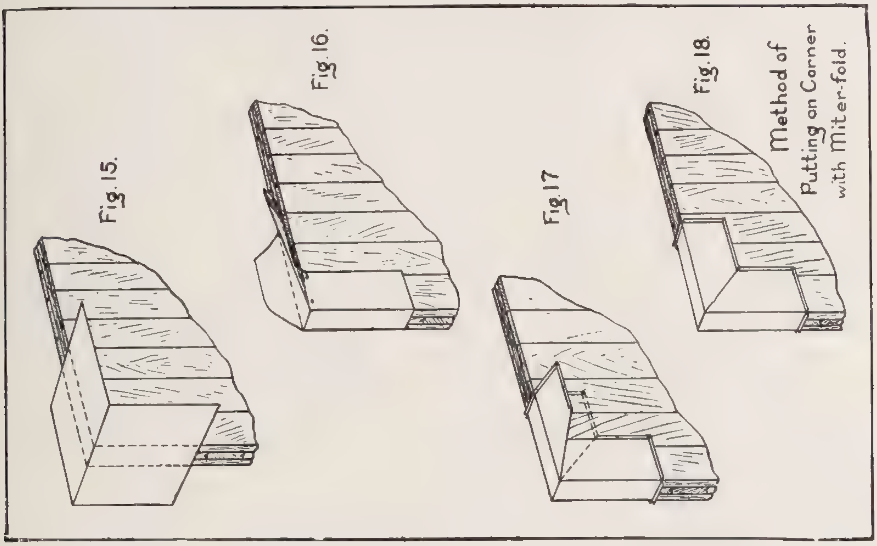


Fig.15. Fig.16.

Fig.17 Fig.18.

Method of Putting on Corner with Miter-fold.

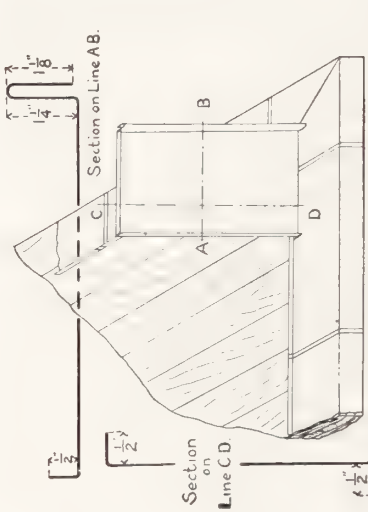


Fig 19A. First Position in Applying Side Sheets Showing Method of Bending.

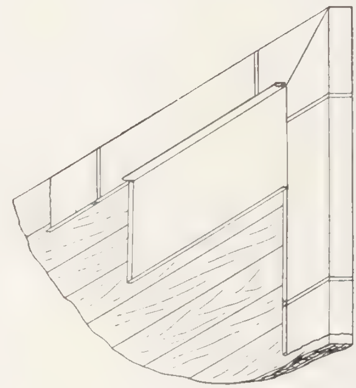


Fig 19B First Sheet in Position Showing Lower Horizontal Seam Finished

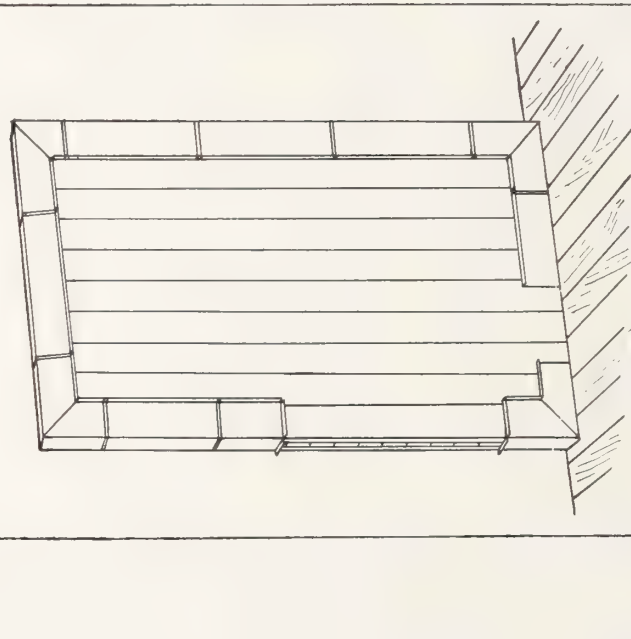


Fig. 19. Covering around Door showing one-half inch Edge standing out from Door.

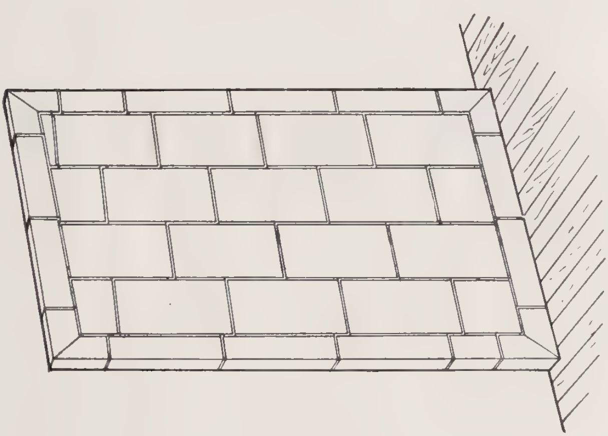


Fig. 20 Door with Tinning Complete.

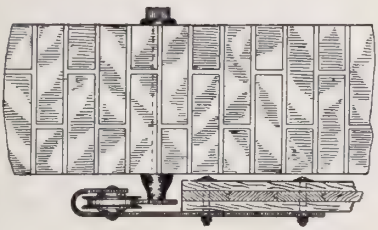


Fig. 21. Hanger.

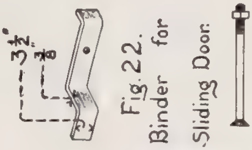


Fig. 22. Binder for Sliding Door.

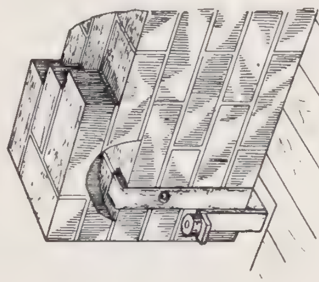


Fig. 23. Bottom U-Shape Roller Guide and Bolt. Countersunk in Sill and Wall

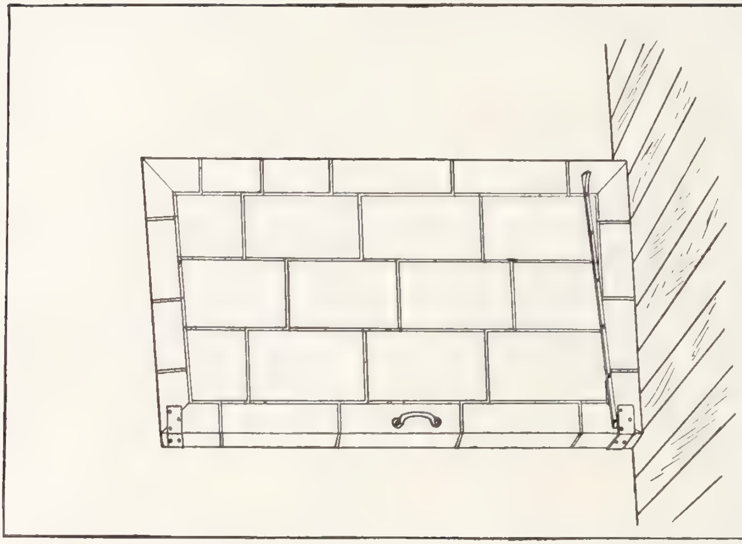


Fig.25. Front View of Door with Trimmings.

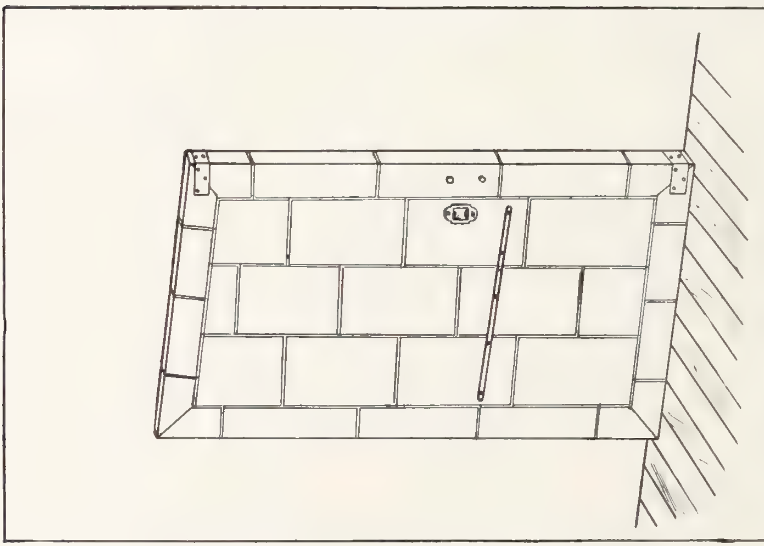


Fig.24. Rear-View of Door with Trimmings.

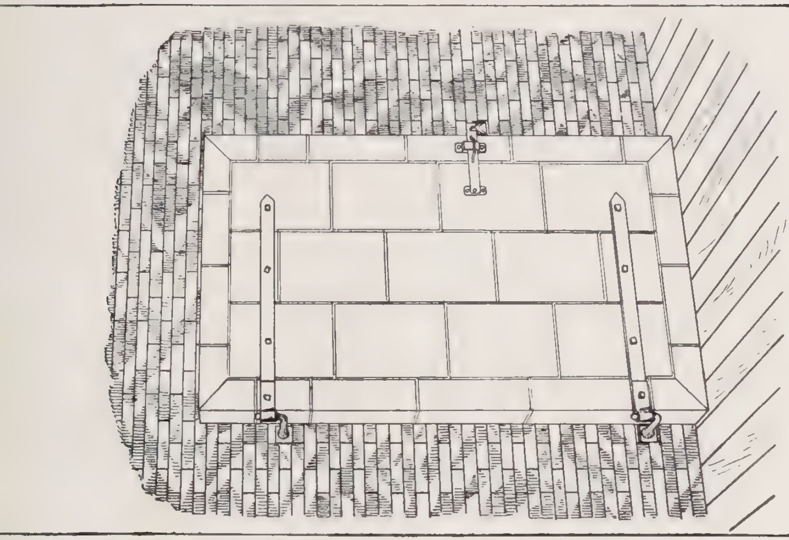


Fig. 27 Swinging Door. Closed.

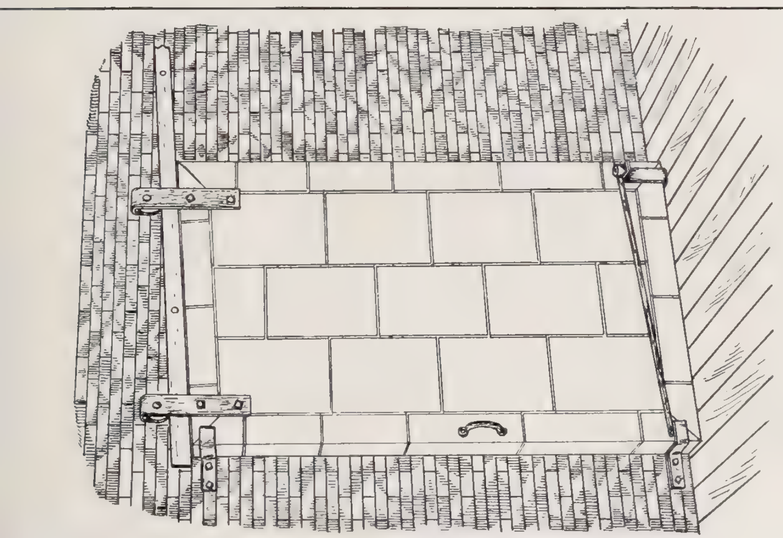


Fig. 26. Door Closed. Properly Hung.
One track bolt under each hanger.

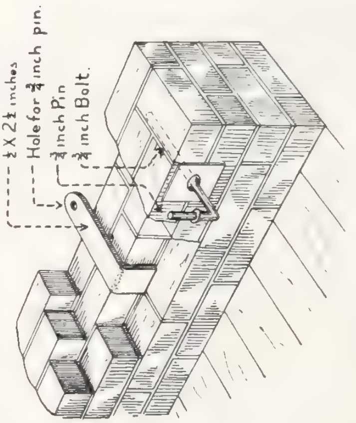


Fig. 28. Wall Eye and Pin.

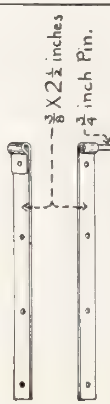


Fig. 29. Hinges with Eye and Pin.

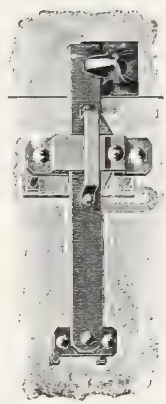


Fig. 30. Door Latch and Catch.

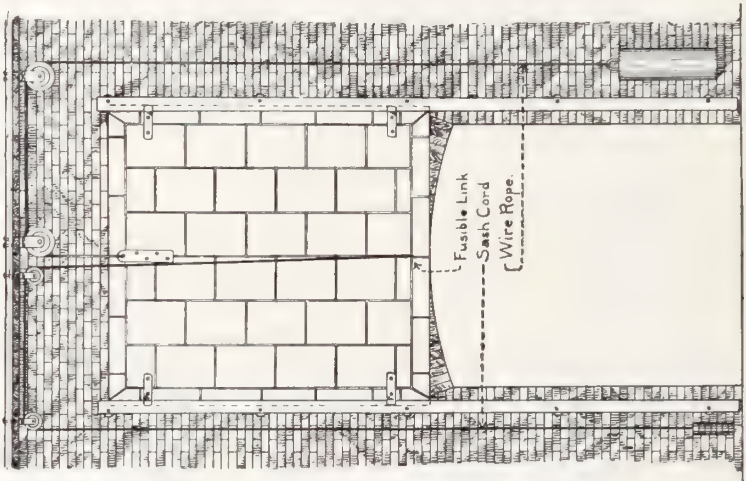


Fig. 31. Vertical Balance Automatic Door.

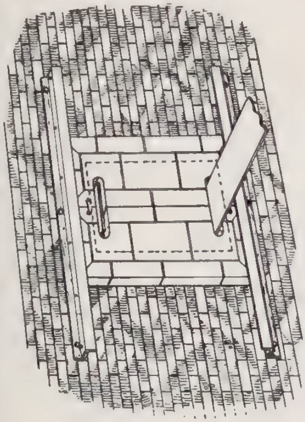


Fig. 33. Door to cover Belt Hole Opening
Dotted lines show the opening through wall.

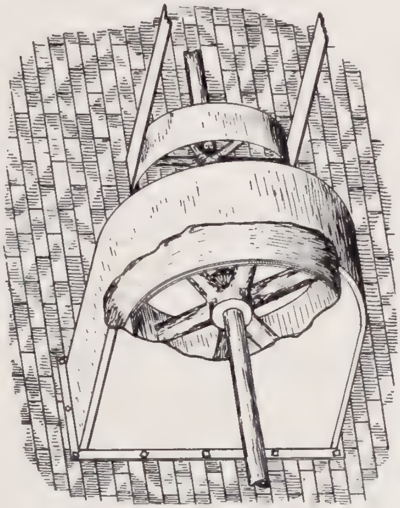


Fig. 34. Metal Hood to cover Belt Hole Opening.

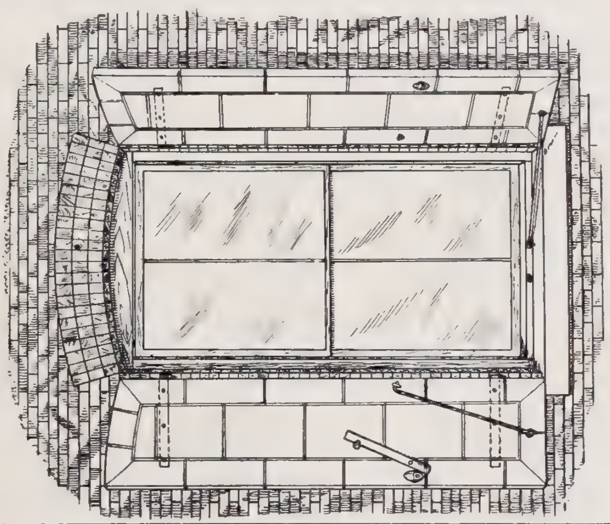


Fig. 32. Fire Shutters

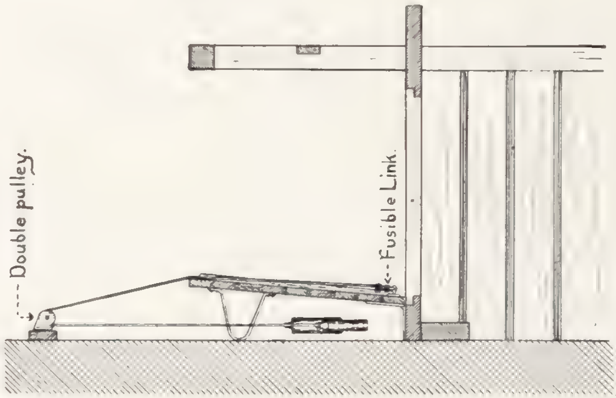


Fig 37 Automatic Trap Door

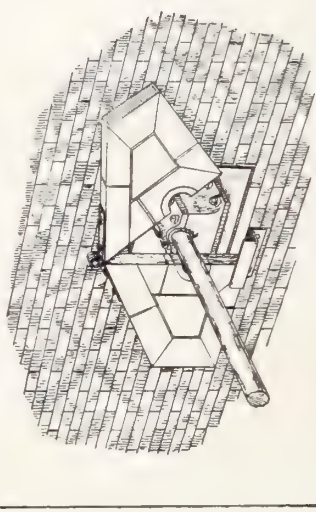


Fig 35 Shutter for Shaft Opening.

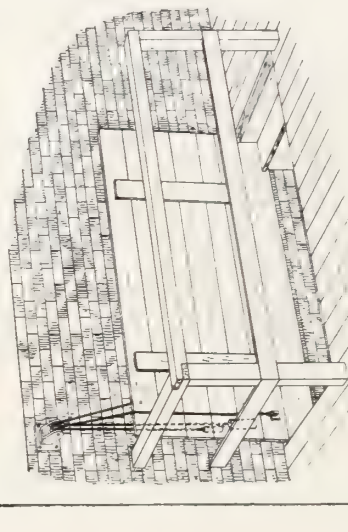


Fig 36. Automatic Trap Door

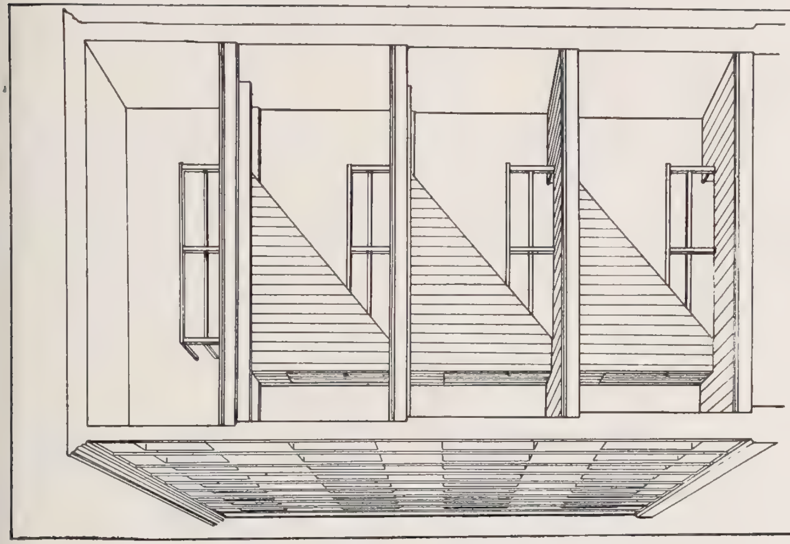


Fig.39. Stairway Enclosures.

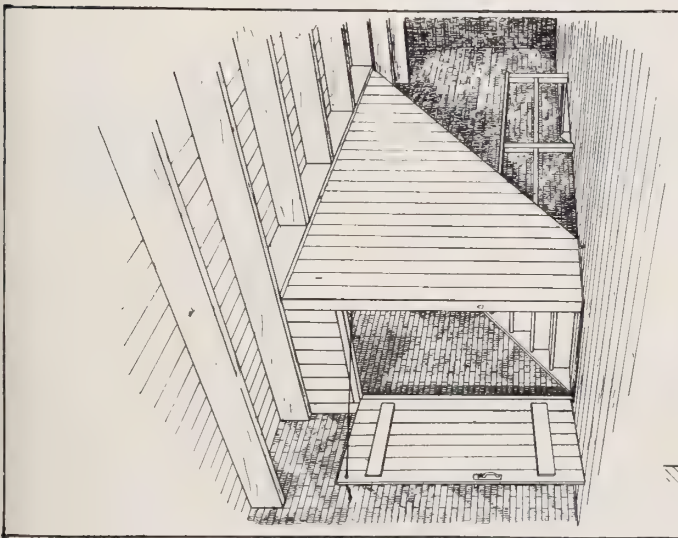
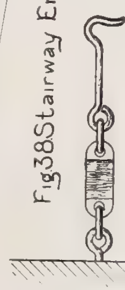


Fig.38. Stairway Enclosure.



Fusible Link and Hook.

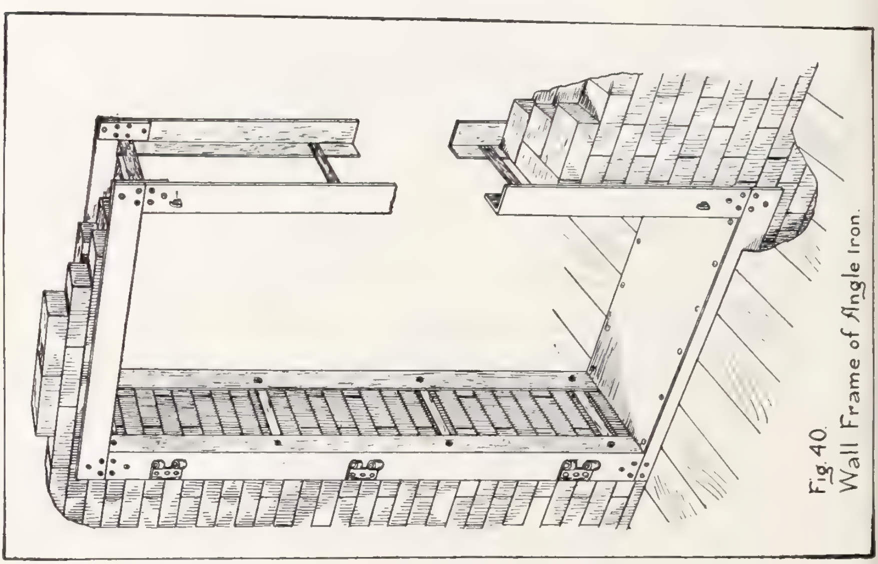


Fig. 40.
Wall Frame of Angle Iron.

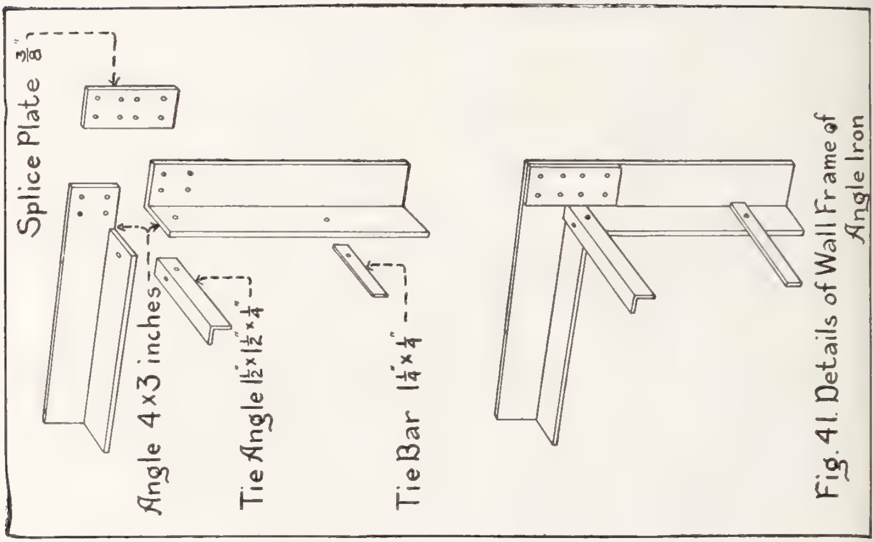


Fig. 41. Details of Wall Frame of Angle Iron

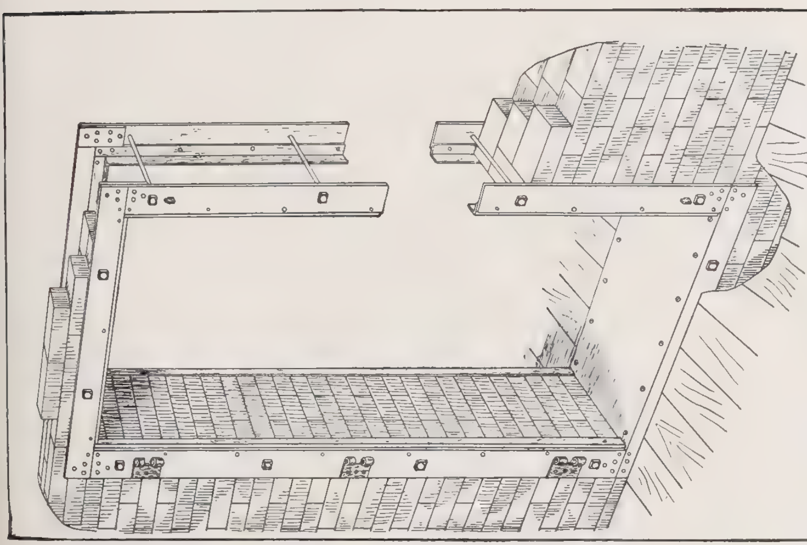


Fig 42 Wall Frame of Bar and Angle Irons
Showing Rabbet for Flush Door.

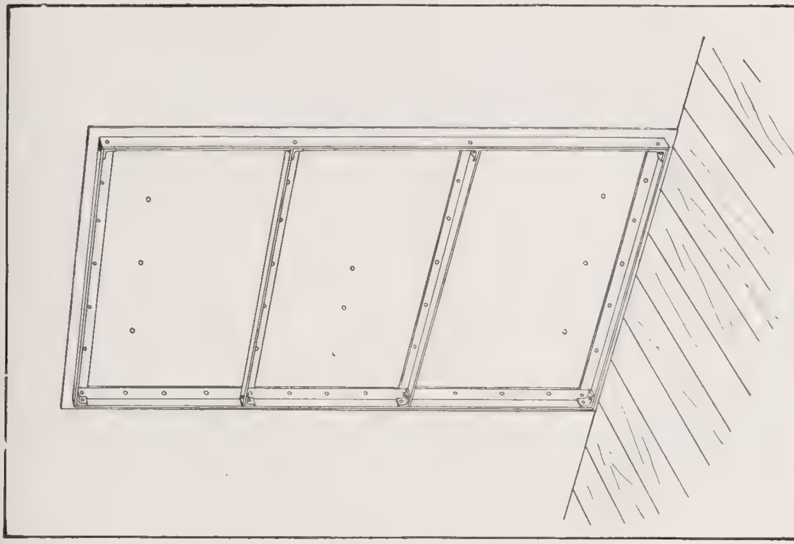


Fig. 43. Panel Frame.

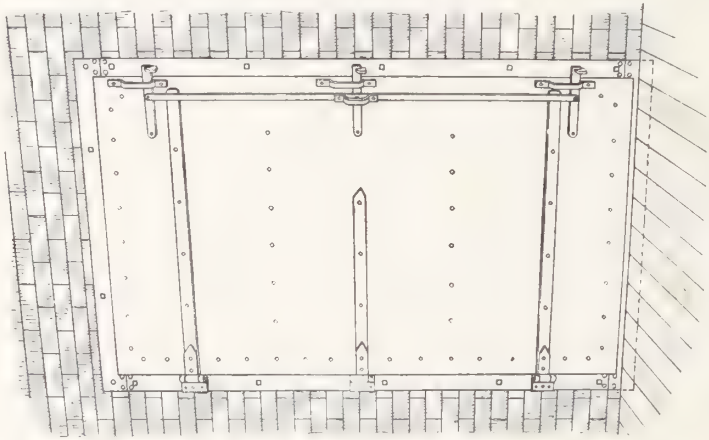


Fig 46 Swinging Door Closed.
Showing hinges, lever bars and catches

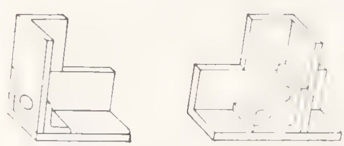


Fig 44 Details of Panel Frame.

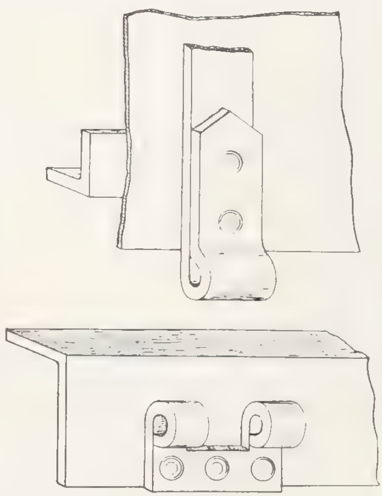


Fig 45. Details of Hinges.

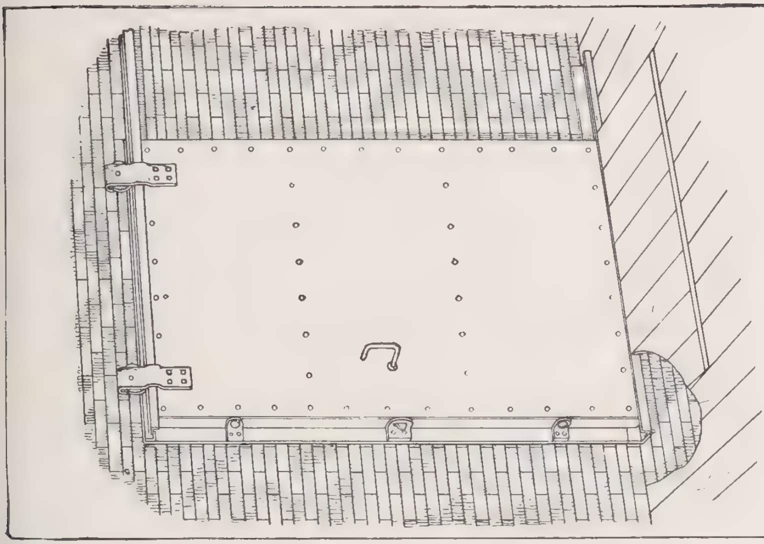


Fig 48. Sliding Door Closed.

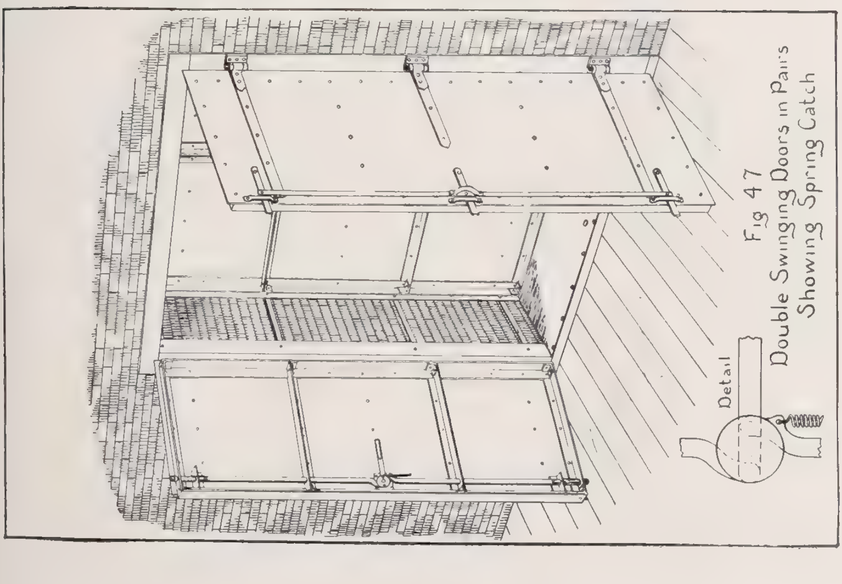


Fig 47
Double Swinging Doors in Pairs
Showing Spring Catch

Fig 50. Horizontal Section of Sliding Door Showing Position of Lugs or Binders

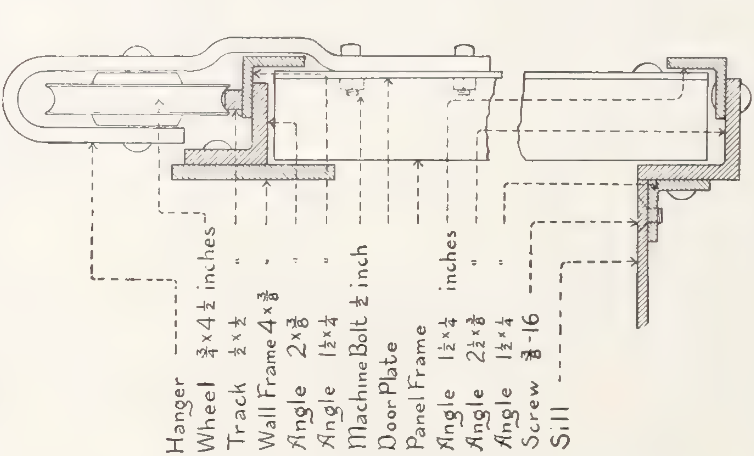


Fig. 49. Detail Showing Hanger and Top and Bottom Channels.

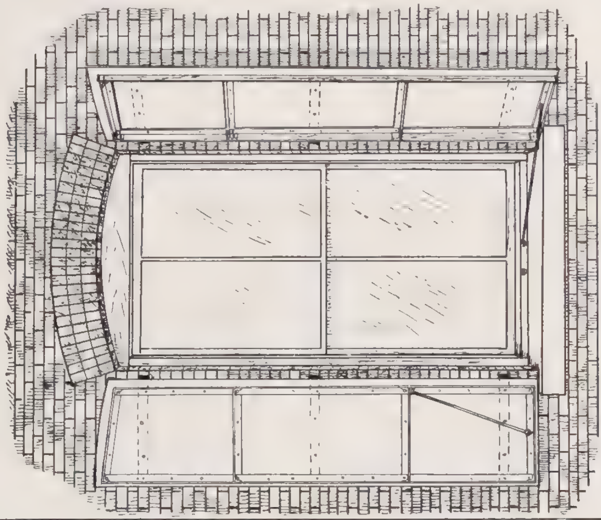


Fig 52. Iron Shutters Open.

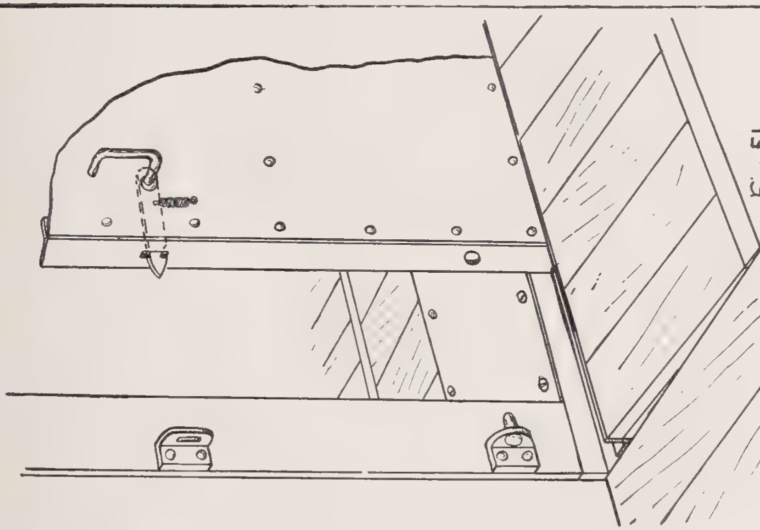


Fig. 51.
Detail showing Latch, Binder and Incline to Sill.

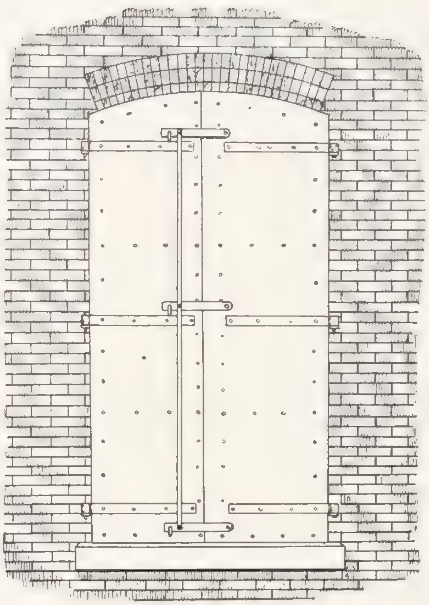


Fig 53. Iron Shutters Closed.

SPECIAL HAZARDS—HOW TO INSPECT THEM.

Manufacturing or "special hazards," so-called, have, as a whole, been unprofitable to insurance companies. This result in profit and loss is not apparent in the totals of the published annual statements of the companies, but glaring differences as to results by classes appear in their analysis tables.

The use of the various products of petroleum, not only for lights, but in the processes of many manufactures; such, for instance, as rubber works, shoe factories, printing offices, bleacheries and print works, dye works, plumbing and gas fitting; gasolene soldering pots, etc., etc., has probably had much to do with the increase in the number of fires in manufacturing risks over those of former years. The enmity of dissatisfied or discharged hands, also, especially in seasons of strikes, sometimes leads to fires, and is a danger which should be carefully considered; it may be regarded as always present, to the extent of being considered an average danger, throughout all classes for large territories. Employers who are constantly quarreling with their help, particularly, are not safe men to insure, and should be avoided.

Of course, the operation of mechanical force and of chemical combinations would naturally involve greater fire hazard than the simple storage of inert substances in warehouses, and it is important that precautions as to cleanliness, management, fire-extinguishing appliances, &c., &c., should be more rigidly observed in manufacturing risks for this reason.

Indeed, there is no process of manufacture which involves motion of any kind, or which depends upon the principles of chemical combination, which is not dangerous to a greater or less degree. It should be remembered, as already stated, that heat results from almost every operation of force. So accurately

has science determined this fact that it is now known that heat has its exact mechanical equivalent (Joule's Law.) A weight of 772 pounds falling through one foot of space will generate heat enough to raise one pound of water one degree Fahrenheit; and, reversing the operation, one pound of water falling through one degree of temperature will produce force enough to raise a weight of 772 pounds one foot high (772 "foot pounds"), thus showing that heat and force are exactly convertible into each other. The insurance inspector should educate himself to the point where, in the interest of his company and, also, in the interest of his customer, he may point out the hazards which both wish to escape. The honest manufacturer, who is doing a steady, profitable business, is frequently injured beyond the amount of actual fire damage, in the interruption of his business and will always be found receptive for suggestions. It is a duty growing out of community relation that each member of a community should contribute for the benefit of his fellow citizens, of the knowledge acquired by him in his calling, and the underwriter should, therefore, fit himself so as to be able to advise his customer not only as to methods which would tend to prevent fires, but as to economies in manufacturing operations which would save him loss of money in unnecessary expense. Such an insurance inspector would always be welcome, and his reception would be very different from that which often greets the surveyor at the threshold of a manufactory, whose owner has been annoyed with one incompetent inspector after another, until he is in no amiable mood either to answer questions or to permit inspection.

The importance of general knowledge on the part of the insurance inspector who desires not merely to save his company from loss but, also, to enable it to receive a premium upon a risk so improved by his intelligent suggestion that it may be safely insured, does not require argument. With this aim in view, he should keep pace with discoveries in mechanics, chemistry and applied sciences, in which more rapid progress is observable in the development of economic processes of manufacture than in safeguarding these processes as to the danger of fire. When the writer of this, and many of his readers, studied chemistry, years ago, there were only sixteen elements, of which hydrogen was the basis. There are now nearly ninety. All of

the gases have been liquefied; and the chemist of that period as compared with the professor of the new chemistry of to-day would be little better than the alchemist of olden time.

To the average chemist fire is simply an incident of chemical reaction and receives from him no more consideration than such phenomena as the casting of a white precipitate in a chemical process, or the discoloration of his blue litmus paper in contact with an acid. He regards spontaneous combustion and ignition as an oxidation no more notable than the rusting of an iron nail, which to him is only another form of combustion, the quantity of heat given out depending for its intensity only upon the time over which the action is extended, rust being simply a slower combustion than that of burning tow or that which ensues when metal is consumed in pure oxygen.

The insurance inspector should have in mind, therefore, at all times, the danger of chemical combinations, which may cost his company thousands of dollars, not merely in the manufacturing portion of a risk, but in the warehouse connected with it, where inert substances may, if mixed together through an accidental breakage of their packages, cause a fire as inevitably as if a lighted match were applied to flax. When a mixture of potassium chlorate and sugar, for example, is touched with a drop of oil of vitriol fire instantaneously occurs.

There are numerous chemicals which are harmless until united with others, but which in combination with comparatively harmless organic substances, such as sugar, flour, sawdust, or such chemicals as sulphur, turpentine, etc., would cause serious explosions, like that in the case of the Tarrant building in New York, which lately destroyed hundreds of thousands of dollars worth of property and resulted in the death of unsuspecting citizens who were compelled to work for a livelihood amid dangers of which they were necessarily ignorant. In this instance the explosion was caused, probably, by a combination of potassium chlorate with sulphur, but it may have been one of a dozen combinations possible and common to miscellaneous chemicals stored in juxtaposition. The average chemist who understands the chemical reaction of mixing sulphuric or nitric acid with turpentine will yet complacently observe their juxtaposition in a warehouse where a broken carboy or a leaking barrel might

bring about an inextinguishable fire. He also knows that chlorine, bromine or iodine would have a similar effect. In the same manner the combinations of potassium or sodium nitrates or chlorates with sulphur, charcoal, etc., may result in the explosive properties of gunpowder of which they are the ingredients. It is supposed that the great conflagration in New York of 1845 was caused by the combination of saltpetre with the carbon of charred bags or burned merchandise and sulphur.

Indeed the inspector should always bear in mind that such combinations may actually be brought about by the efforts of firemen to extinguish a fire. An inch-and-a-quarter-hose stream, with an initial pressure at the nozzle of eighty pounds to the square inch, would be a disturbing factor in a room filled with miscellaneous chemicals and cause inextinguishable combinations of substances supposed to be properly separated. I need not suggest what would be the effect of phosphorous deprived of its water covering and distributed over other merchandise.

One of the most disastrous explosions, resulting in loss of life and property, occurred recently from the storage of potassium chlorate on the same floor with sulphur, sugar or some other organic substance. This salt deflagrates violently with combustible matter and is liable to explode by friction or blows, and for this reason is not used in making gunpowder, potassium nitrate being preferable for that purpose.

A dangerous compound is produced by the contact of chlorine with ammoniacal salt, resulting from the chemical reaction of chlorine gas passed into solution of ammonia. In a fire, nitric acid would form a most dangerous compound with hot powdered charcoal or with warm oil of turpentine, and for this reason should be stored under conditions preventing such combinations.

Chloric acid may be so concentrated as to set fire to paper or other dry organic matter by reason of the fact that it is so easily deoxydized by combustible substances. Nitrogen chloride is probably one of the most dangerous explosive substances known.

But the chief reason why so many special hazards burn is the want of foresight on the part of manufacturers, and of oversight on the part of underwriters, in not securely separating from the great bulk of property exposed to a fire those dangerous processes which might easily and at small cost be entirely isolated.

It is too frequently the case that a dry kiln, for example, involving a value of only a few hundred dollars, is unnecessarily so located as to inevitably burn the entire plant when it could be isolated so as to burn without a loss greater than the value of its own contents. Agents should aim to have risks subdivided in this manner to insure greater safety and lower rates for the larger values. Where rates are intelligently made, the owner is sometimes handicapped for the entire life of the structure with a higher rate charge on the entire value at risk, when he might have been called upon to pay it only on a small amount of specific insurance in the limited area of danger.

It took years of losses to convince the owners of cotton-mills that the picker should be in a separate structure from the mill, and it may require more years of disaster to convince owners of flour-mills, planing-mills, paper-mills and other special hazards that safety and economy lie in similar subdivisions of their risks, so that the whole property need not be lost by a single accident.

On the top floor of a large department store in one of our Western cities, where a million dollars of insurance was carried, the writer found a waste picker employed for tearing up jute and other dangerous, ignitible materials for the manufacture of cheap, upholstered furniture and so endangering the entire plant and increasing the cost of insurance each year to the extent of ten times the value of this department of the store, when the whole thing might have been kept in a small, cheap building outside. The owner was prompt to act upon so obvious a suggestion, and possibly a million dollar loss may thus have been prevented.

On the top floor of the large Coronado Hotel, at San Diego, Cal., the writer found the shop for upholstering and repairing broken furniture, with heating of glue, &c. The work could just as well have been done in a small, inexpensive building, where it would not have endangered life or property.

It should be the business of underwriters to suggest and enforce these improvements by discriminating rates. When special hazards are constructed with reference to the rules of prudence and common-sense, each establishment being divided into two or more distinct risks, the more dangerous portions, such as dry-rooms, paint-rooms, picker-rooms, boiler-rooms, oil

storage rooms, etc., being completely isolated, so that their burning will not endanger the larger values, we may expect to see planing-mills and other dangerous specials insured at rates which their owners can better afford to pay, but which will, at the same time, yield a profit instead of a loss to the insurance companies themselves.

It is possible, by the judicious division of even the most dangerous risks, to confine a fire to a comparatively small value, and thus materially to improve them. A very large percentage of almost every manufacturing risk involves no greater hazard than that of a storage warehouse, and might be insured at warehouse rates but for unnecessary and inexcusable exposure of large values to dangerous processes. The owner who subjects the whole of his property to the consequences of a single accident has no one but himself to blame if the underwriter who insures his risk points out the danger and charges, on the whole value at risk, the proper rate due to the most hazardous portion.

Agents cannot be too careful or thorough in their inspection of special hazards. *Every part of each building should be examined, from sub-cellar to garret.* Closets, work bench drawers, tool chests, dark attics, and all concealed places should be examined for oily rags or oily cotton waste. All concealed places are dangerous.

While it is important that they should notice every detail of construction and management, it is often the case that careful men overlook vital faults which may involve the destruction of a building, such as stone pillars, naked iron columns and unprotected ironwork generally. A fire emphasizing the importance of going to the very roof of a building occurred August 10, 1902, in the Bank of New York Building, No. 48 Wall Street, and illustrated the utter unreliability of unprotected iron as a building material. This building was intended to be fireproof. It was occupied throughout for offices only, and there was nothing in it more combustible than office furniture. But it happened that a lawyer's office was being redecorated and the furniture was temporarily placed in the hallway, where its ignition from a fire caused, probably, by the spontaneous combustion of painters' greasy overalls, afforded a strong draft through a light-shaft extending from the second floor to the roof.

The roof was built of 4-inch tiles, between 2½-inch inverted T-irons, resting on 5-inch I-beams, and supported on light steel angle-iron trusses. The tiles were covered with flat, one-inch, roofing tiles, laid in an asphaltum composition. When the heat reached the attic, in which several of the employes slept, it warped and twisted the ironwork of this roof so that the T and angle-iron failed to carry the superimposed weight and the roof was wrecked. If the ironwork had been protected merely by a suspended metal and plaster ceiling (although this is usually an inadequate protection) it is not likely that it would have been injured. Probably every inspector of this building had overlooked this vital fault, if, indeed, he went so far in the course of his inspection as this attic space or cockloft.

There are many inspectors of the casual kind who would have described this attic, even if they had climbed so high, as a fireproof room with an iron and tile roof, whereas a wooden beam roof would probably have stood better.

The accompanying illustration shows the twisting of the ironwork. The heat which wrought this damage was not sufficient to thoroughly cremate all of the furniture of this attic bedroom.

Another instance, in the same city of New York, was that of the damage done to the American Fine Arts Society Building, in May, 1901.

The roof was of sawtooth type, partly built of 3″ x 12″ x 16″ tile blocks set between inverted iron T's, and partly of concrete between I-beams, resting on light iron I-beams, all supported on light iron trusses resting on the side walls and two cast-iron columns. The ceiling of the top floor was plastered directly on the underside of the roof blocks and concrete, but the iron I-beams and roof trusses were entirely unprotected, and were warped and twisted in all directions, the entire upper floor being practically a total wreck. The cast-iron columns, being protected by a tile covering, effectually resisted the heat.

FIRE IN THE BANK OF NEW YORK BUILDING, AUGUST 11, 1902
SHOWING COLLAPSED ROOF AND EFFECT OF FIRE ON IRON TRUSS SUPPORT OF ROOF

No doubt the inspector, if any there was who went so thoroughly through the building as to reach this portion of it, finding little inflammable material and observing only iron and a tile roof, concluded there was no danger; but the iron was so light as to be strong enough only to support, while cold, the dead load of the roof covering, and at the higher temperature gave way and succumbed to its load.

In the case of the Home Life Building (see page 121) the sturdy walls of the court on the north side were cracked and injured by the expansion thrust of iron plate and lattice girders, which are shown in the photograph, and which actually injured the brickwork they were intended to brace, although the heat to which they were subjected was simply the ascending heat of an exposing building.

A serious damage was done to the Manhattan Savings Bank Building (page 123) by the expansion thrust of a large iron box girder whose temperature was raised by a fire across the street to a point where it forced out the side wall.

Could anything illustrate more clearly the utter unreliability of iron when unprotected than the accompanying illustration of the effect of fire on the sixth floor of the Horne store building, in Pittsburg, showing the collapsed roof?

From a report made by Inspector Stewart, of the Continental Ins. Co., two days after the fire, I make this abstract: "Everything on the fourth, fifth and sixth floors was destroyed, even the nailing strips, buried in the concrete of the floor, burning. A feature was the breaking off of the bottoms of the tile arches in the ceilings of these stories, exposing the interior ribs, while the upper surface remained intact and the steel work was uninjured. The first, second and third floors were uninjured by fire, but the flames communicated with the basement through a chute inclosing an endless chain, used for carrying baskets from floor to floor. With fierce fires above and below, it was remarkable that the loss on the lower floors should be so light. The weakest point in the building was the roof. No attempt had been made to protect the steel work in the attic, and, as the sixth floor was unusually full of reserve stock, the fierce flames soon burned through the plaster on expanded steel which formed the ceiling and damaged the steel work on the roof so that it will have to be replaced."

SIXTH FLOOR OF HORNE STORE BUILDING, PITTSBURG, BURNED APRIL 9, 1900.
SHOWING COLLAPSED ROOF AND THE EFFECT OF FIRE UPON UNPROTECTED IRON

The similarity of this photograph to that of the roof of the Bank of New York Building is noticeable. Can it be possible that any Insurance Inspector, after seeing these two illustrations of the utter unreliability of iron when uncovered, would fail to call attention to such unsafe construction wherever met with?

It is the inspectors who show discernment in such important matters, detecting points of vital structural weakness which involve the very life of a building, rather than those who pay attention to detail at the expense of more important matters, who make money for their companies and at the same time save money to the property-owners whose risks they inspect, and who are naturally ignorant of such facts as the unreliability of naked iron and the utter worthlessness of stone as fire-resisting material.

My guide in the Adirondacks, in his pioneer work of removing granite bowlders to make room for his forest home, economical of gunpowder and dynamite, effectually disposed of the rocks by kindling fires upon them and then, when thoroughly heated, throwing water on them, quickly reducing them to sand and fragments. Could there be a better illustration of the ridiculous construction of using stone for weight-carrying members of buildings! What a commentary upon the architecture and engineering of the twentieth century that such material is relied upon for pier bonds, caps, columns and the very foundations of costly structures, where the same combination of fire and water would result in a loss of millions of dollars.

VARIOUS PROCESSES.

An observing, intelligent inspector, while considering any risk for insurance, would naturally give such careful investigation where heat or light is employed as to need few suggestions on this score. The old adage "Where there is smoke there is fire" may well be supplemented by the statement: "Wherever there is heat there is danger."

The very safeguards employed by ignorant people are frequently unreliable and need to be thoroughly investigated. The practice of putting bricks on a wooden floor under stoves or furnaces, for example, is peculiarly dangerous, because coals and hot ashes sift between the interstices of the bricks and ignite the floor below, the bricks serving merely to conceal the charred

floor. There should always be an iron plate under such a brick platform. Metal nailed to woodwork as a fire screen to protect it against the heat of a stove or furnace is usually fastened tightly to the surface of the wood, instead of having an air space, which is needed for protection. The bright tin, which reflects heat, also conducts it, and the tin sheath—which if separated a quarter of an inch from the wood would save it from burning—would actually contribute to ignition if fastened to the surface without any air space at all. In the case of fireproof doors and door frames, however, where the tin encloses the wooden door or frame it must, of course, be nailed close to exclude air.

Steam pipes are often separated from wooden supports by inserting a piece of iron, which is no safer than a thicker steam pipe would be.

Where steam pipes pass through floors, an iron guard of conical or "canopy" form in two sections, of cast iron, should be fastened to the floor around them so as to keep roving waste or other ignitible material from collecting in the hole of the floor around the pipe where it would be almost certain to cause a fire. Such a cone-shaped protection extending two inches above the floor would facilitate sweeping for keeping the floors clean and might prevent a fire.

The great enemy of the underwriter to be carefully watched and provided against, which no obtainable rate will pay for, is untidiness, carelessness as to rubbish, waste, ashes and other accumulations, which are dangerous, whether found in the cellar and attic of a dwelling house or in the various stories of a mill. It is safe to assume that there is no such thing as "clean waste" and that all accumulations of rubbish, even leather chips, are objectionable, because they almost invariably contain self-igniting substances or become the resting places for castaway cigarettes, cigars or half burned matches.

As already explained, the sweepings of floors which have been covered with sawdust are particularly dangerous, and all sweepings and accumulations of rubbish or waste should be kept outside of the building insured, where their ignition would not endanger insured property.

It is always best to decline a dirty risk, and those owners should be avoided who do not follow up their employees to see

that all portions of a building, from the sub-cellar to the cock-loft, are kept cleanly swept and free from rubbish.

The best receptacles for waste are large iron kettles or cans on legs, lifting them from the floor, and with hinged metal covers, whose contents might burn out without igniting the premises; and they should be emptied each night, their contents being burned under the boilers before the closing hours, or removed from the premises to a safe distance. The best receptacles for matches are large stone jars with covers, as already explained.

If the writer has become monotonous on this subject it is because he attaches greater importance to cleanliness than to almost any other feature of a risk

In order to save the repetition in each risk of suggestions as to the danger of various processes—drying, soldering, brazing, japanning, &c., &c.—I shall, at this point, take up these various processes, and merely refer to them later on in connection with the various risks of which they form a feature. Most of these processes require so little room, involve such small values, but are so dangerous as regards fire, that the simple rule should be observed of keeping them outside the main buildings, since they can be easily separated from the larger values of comparatively harmless processes.

It is, for example, not at all necessary that singeing, napping, drying, japanning or enameling, buffing, lacquering, tumbling, picking, &c., &c., should be in or near buildings which would be endangered by their numerous fires.

Annealing. Advise Company as to location of furnace and fuel used. See that ovens are properly set and that all exposed woodwork is properly protected.

Boiler Rooms. Should be cut off absolutely in all wood-working risks, and in other kinds of risks if other than coal fuel is used, especially if shavings or slabs are used for fuel. In examining boiler rooms the agent should be careful to notice whether any materials are deposited over the boilers to dry. Wood for fuel is sometimes piled over them to dry, when wet—a most dangerous practice. In one instance coming to my notice a can of petroleum lubricating oil was kept over the boiler of a mill, in order that tne oil might not freeze, where a leak would have caused a destructive fire. Such practices should condemn

a risk. It is not safe to rely on assurances of reform in such flagrant cases of carelessness.

Where the space above boilers is used for drying wool or other materials, as it sometimes is in low grade mills, great care is necessary to keep the tops of the boilers cleanly swept. They should always be covered with masonry, and the wool or other material so secured that it cannot fall upon them. No risk of this kind should be accepted unless inspected by the special agent, and should be referred to the company Where boilers are forced at times above the pressure allowed by the boiler inspector (and this is sometimes the case where the boiler is not large enough for the horse power of the engine) the risk is not a safe one and should be avoided.

Boilers underground are rarely safe, especially if the ground above them is used for piling lumber or other combustible material, as is sometimes the case in planing-mills, saw-mills, etc. Owners rely on the masonry arches over the boilers, forgetting that, in time, these must yield to the constant heat, when flames are sure to escape to any ignitible material above.

Where shavings are used for fuel, at least three per cent additional should be charged if the boiler-room exposes the main risk. The use of shavings for fuel is dangerous, not only because of the creeping of fire from beneath the grate bars by the loose shavings around the doors, but because of the danger of what is known as a "back draft," which is a common cause of fires in planing-mills. When the draft of the chimney fails, or is poor, as it sometimes is, in damp weather, the entire contents of the furnace may be thrown out into the shavings vault or adjacent room. The furnace feed, therefore, should not be in line with any communication with the main structure, but at right angles to it, so that in case of a back draft the burning contents of the furnaces cannot be thrown into the other rooms of the risk.

Chimneys to boiler furnaces should be built especially for the purpose. A chimney not so built, but afterwards adapted to the purpose. is rarely large enough or safe. They should have an internal capacity of not less than 12 inches in diameter, or 144 square inches, and should be constructed with double walls, with an air space between the inner and outer walls, especially

if inside of the building. No woodwork should be framed into them, and they should rise at least twenty feet above the peak of any shingle roof near them; and where wood shavings or slabs are burned for fuel they should be provided with good spark-arresters.

Iron chimneys are liable to rust and permit sparks to escape into roofing or other woodwork through holes. If used, they should be well stayed with iron stay-rods or chains, and kept clear of all woodwork by at least eighteen inches space and metal sheathing.

Standard Boiler Room. A boiler room to be standard should have nothing combustible in its construction. There is nothing impracticable in this suggestion. The room is not necessarily a large one. It requires no ornate finish. It is only one story high, and as in most risks it is the most dangerous part of the hazard and is liable to explosions of boilers and to ignition of stores of fuel, especially where wood or shavings are used, there is no reason why it should not be effectually cut off from the main structure or why its construction should not be such that it will safely cremate its own combustible contents of coal or wood. The walls, therefore, should be of brick. Being one story, they need not be over twelve inches thick, except that next the mill, which should be 24 inches thick. The floor should be brick, or concrete manufactured in the proportions named on page 81. A concrete floor is best adapted for shoveling coal and for keeping the combustible dust swept into the fire pit. The roof should have nothing in its composition of a combustible character. It may be laid on iron trusses of T and angle iron and these might be fireproofed, although as the structure is only one story it may not be necessary.

Fuel. Examine the location of the supply of fuel, especially if bituminous or soft coal is used, which is very liable to spontaneous combustion. In an exhaustive report on this subject by Professor John M. Ordway to Mr. Edward Atkinson's companies, he says: "The spontaneous combustion of coal is owing, I believe, mainly to the oxidation of the pyrites contained in it. Some coals are more liable to trouble than others, not simply on account of their containing more pyrites, but rather on account of the particular kind or condition of the pyrites. To favor the oxidation there must be:-

1. Some moisture. When the coal is quite dry there is less danger.

2. A moderate supply of air. Total exclusion of air would prevent it, and a thorough ventilation would also be likely to prevent it; but the thorough ventilation of large masses of coal is impracticable.

3. A great body of coal.

4. A warm place of storage.

5. Freshness. Coal just taken out of the mine is more inflammable than that which has been kept a year or more."

His deductions are that to guard against spontaneous combustion one should avoid the use of coals which have a bad reputation for spontaneous ignition. Coal should be kept dry and cool and in piles of moderate size. The heaps should be examined from time to time by digging in places to see if there is any heating or any smell of gas. He suggests putting in a few vertical iron pipes so that in case of smoke or suspicious odors a hose could be attached and water thrown into the middle of the pile, but he advises that these pipes should be plugged at the top so as not to allow in air sufficient to give oxygen and yet with enough vent for gases or smoke formed below. The coal should not be in contact with the masonry work of boiler settings, nor piled against wood or around wooden posts.

Oil for Fuel. The use of petroleum oils for fuel has been growing of late years. The regulations of the National Board should be complied with in all cases and may be secured of the General Agent in New York. Those systems which feed fuel to the boilers by gravity should be prohibited.

Buffing. This is an important hazard of metal-working establishments, especially those manufacturing bright goods. The lint or fluff, which is discharged from the wheels saturated with grease and other substances, is subject to spontaneous combustion. In all cases the machines should be connected with blowers depositing "fly" into suitable receptacles partly filled with water, located outside; metal receptacles should also be provided in the buffer room for the smaller particles which are not withdrawn by the blower system, and accumulations of waste on wheels and bearings should be cleaned off daily. When building is not fireproof, floors should be covered with

incombustible material and there should be no concealed places where the lint or fluff can accumulate.

Brazing. If gas flame or blow-pipe is used it should stand upon a bed of incombustible material, preferably on iron supports. All exposed woodwork should be thoroughly protected. Where the two surfaces or points to be brazed are united by being immersed in a crucible containing spelter in a molten form, it is unnecessary to suggest that the surroundings should be of fireproof material, and the furnaces should be provided with hoods venting through the roof.

Where petroleum or its products are used for fuel and fed by gravity the system is usually too dangerous for insurance purposes, especially where artificial heat is applied to the kerosene or petroleum to generate gas, as where the supply pipe passes through a steam jacket or other heating surface.

Cutting. Most processes for cutting material, whether the less hazardous of cutting cloth into clothing, or the more hazardous of cutting ignitible materials into small pieces, as in paper mills, are dangerous; and in the case of paper mills, where old rope, junk and other material is reduced to the condition for making paper pulp, should be separated from the main structure.

Deviling. This should be in a separate structure; is of the nature of picking and cutting.

Dusting. All dusting processes should be in a separate structure where they would not endanger the larger values.

Drying. Dry-room for Wood, Lumber, Textiles, Wool, Cotton, etc., should be thoroughly cut off from larger values. The steam or hot water pipes should be either above the material to be dried or at the side of it, and not below the material, where distillations of pitch, resin, etc., shavings, sawdust or other ignitible substances can fall and collect upon them. Any system of drying which admits of the falling of material, shavings, or dust, &c., upon heated surfaces is dangerous.

In all dry rooms *ventilation should be provided*, to admit of the escape of inflammable gases generated during the process, and they should, also, be so arranged that they can be closed airtight if necessary, to smother a fire.

There can be little doubt that many of the fires originating

in wood-drying rooms are caused by the ignition of inflammable gases generated by the drying wood. That wood subjected to heat will evolve such gases may be proved by the familiar experiment of thrusting a stick of pine wood into a fire. At the opposite end from the flame there will escape gases which may be readily ignited by applying a match.

It is now claimed, after careful observation, (see p. 151) that wood subjected for a considerable length of time to high temperatures, as in dry-rooms, gets into a condition which may be termed self-igniting. This explains the mortality in wood dry-rooms, laundry dry-rooms, wool dry-rooms, &c., &c. Whether wood ignites spontaneously in this condition or not, no one will dispute the fact that it is in such an ignitible condition that contact with the slightest flame would spread instantly to all portions of a room.

Automatic sprinklers should be provided in all dry-rooms.

Steam jets, which could be turned into such dry-rooms from the boiler-room, would be admirable for extinguishing fires and should never be omitted. They should be arranged with a signal to the engineer, so that he could be notified to turn on the steam instantly in case of fire. The door could then be closed and any fire would be quickly smothered.

Enameling. See Japanning.

Forging. Floors should be of fireproof material; if wooden floors beneath forges, they should be protected by one course of brickwork on iron, and said protection should extend at least 4 feet around forges and surround anvils. Metal hoods should be provided and chimneys and vents must be kept safe distances from woodwork.

Galvanizing. Advise Company as to construction and location of furnaces and fuel used, coal or coke being preferable to wood. Setting of furnace should be investigated thoroughly, and the floor, or certainly that portion within ten feet of the furnace, should be fireproof. A good metal hood should be provided over the entire furnace.

Gluing. Glue pots should be heated by electricity, steam or gas. They should be on iron stands, free from woodwork, and if they have to be set upon benches or tables the woodwork should be protected with an air space between the wood and the

metal of at least half an inch. If set in wooden tables (*i. e.* with tops flush with surface of tables) they should be protected by metal collars at least 4 inches larger in diameter than the pots, with an air space of at least 2 inches to the surrounding woodwork; if an open flame is used, as in the case of a gas jet, the burner should be at least two inches above the bottom of the metal collar. Kerosene and gasolene for heating are especially dangerous, involving the danger from carelessness in handling the material as well as from explosion of the lamps. One great danger of gluing processes is the tendency of workmen to leave the gas or other heat on after the building is closed for the night, where woodwork may become ignited by being overheated or where ignitible substances can be blown by drafts of air into the flame and ignited.

Japanning, Enameling, Etc. With any process of drying the materials used for these processes are liable to form gases. They are very volatile and inflammable. Not infrequently benzine is a dangerous factor. The dipping process is especially hazardous, owing to the presence of the volatile material in large quantities, and all work of this nature should be cut off from the main factory in a separate building where it could burn out without endangering other values. The building in which japanning is done should be fireproof.

Lacquering. This process is dangerous because of the volatile and inflammable character of the lacquer. In some cases celluloid thinned with ether and alcohol is used, shellac, varnish, turpentine, etc. The method of dipping is more dangerous than the old-fashioned method of applying the lacquer with a brush. In the latter process, if on a small scale, it may be carried on in main risk when good care is exercised; but in all cases where a considerable quantity of this work is done or when there is any dip work it should be outside of and not endangering main buildings.

Melting. The smaller furnaces, such as those used for melting the softer metals, confectioners' stoves, tailors' busheling stoves, and other stoves requiring a high degree of heat should be placed upon two courses of bricks well laid in mortar *on sheet iron* extending at least 2 feet outside of furnaces on all sides. If furnaces be on iron legs one course of bricks is sufficient.

All exposed woodwork should be protected by incombustible material. In cases where inflammable materials, such as resin, etc., are heated, the floor protection should be surrounded with a coping of sheet iron at least 4 inches high to prevent the burning liquid, in case it should run over, from running on the floor. Wherever fire heat is used it should be outside of the main structure if possible.

Napping. This should be cut off from the main structure, whether by gas or red hot iron. The process is a dangerous one.

Painting. The danger of painting has been largely increased of late years by the use of benzine and other dryers in place of turpentine, which was bad enough. Inspect the painting room carefully. Oily waste, rags, &c., should be kept in metal receptacles *and removed every night.* Linseed oil, as already explained under the heading "Spontaneous Combustion," is particularly dangerous when spread out on finely divided organic substances, like rags, waste, sawdust, etc. Sawdust should never be allowed on the floors of a paint room; it means the ultimate gathering into barrels of a particularly dangerous mixture. Sand in metal trays is the best material to put under faucets, etc.

All painting, especially where cheap benzine dryers are used, should be in a separate structure, and the supply of paints, oils, &c., should be securely segregated.

Where painting is by the bath or dipping process, as in the case of cheap furniture, great care must be taken, as the large quantities of inflammable paint are liable to cause intense combustion. Tanks should have tin-lined, hinged covers, so that they can be closed at night when not in use, and when in use should be held open by a fusible link, which would melt with a rise of temperature and release the cover.

Pickers. All pickers of whatever character, whether woolen, cotton, waste, upholstery or otherwise, should be cut off in a fireproof room. They are peculiarly liable to fires from foreign materials, such as nails, passing through the picker and striking fire on the teeth and igniting the substance picked, which is usually of an ignitible character.

Soldering. City gas is the safest fuel for heating irons, unless

gasolene gas is used, where great care must be exercised not merely as to the construction of the fire-pot, but as to the storing of the material. Large values should not be endangered by this process, especially as it is unnecessary that they should be. Charcoal pots should be stationary and the system of flues should be metal leading to a brick chimney. The New England Exchange requires that pots should be placed in an iron pan filled with sand—an admirable precaution—and charcoal pots must have a separate metal flue pipe, not less than $2\frac{1}{2}$ inches in diameter, leading into a main pipe, which carries all the draft into a brick chimney. Gas furnaces should have as good protection beneath as charcoal pots; if sand is not used they should be set upon iron legs with at least three inches air space beneath, and be placed on metal with additional air space to work bench. Work benches where soldering is carried on should be of incombustible material or metal covered. If gasolene gas machines or oil systems are used, get the National Board specifications for safety. They can be obtained by writing to the General Agent of the National Board at New York, or to the insurance company.

Sulphur Burning. This should, of course, be in a separate structure, fireproof, where it would not endanger the main buildings.

Tinning. This should be thoroughly cut off from the main structure. The arrangement of furnaces, grease pots, etc., should be carefully noted and the Company advised. Also note care of cotton when used. The furnaces should be hooded.

Tumbling. The danger of this process is practically confined to the waste material, especially where sawdust is used, which with the iron clips when saturated with oils is liable to spontaneous combustion.

Varnishing. Under no circumstances should this process be carried on in the main structure. It should be in a separate fireproof room. The electric and friction hazard of machine painting and varnishing is serious. Patent varnishing machines with driers attached are especially dangerous.

Oil rooms, in which the supply of oils is kept, should be outside and never under or near stairways or elevators, so as to endanger them in case of ignition or explosion. The burning

of a large building with its contents, several hundred thousand dollars in value, some years ago, was due to the rapid spread of a fire originating in a closet under the elevator. Moreover, as staircases and elevators are the means of egress for workmen, and as vertical pipes and hose attachments ought to be near stairways, for the use of firemen, not only may the property be endangered if the stairways be made impassable, but the lives of operatives and firemen, also.

Gas Meter. This should be in a safe part of a building, where least liable to accidents, and where it may have free ventilation to the air, and the valve for shutting off the gas from the building should be near the entrance, so that the firemen may shut off the supply from the building in case of fire. Indeed, all buildings should be arranged for shutting off gas and electricity at the street entrance.

Water Power. While water power is preferable, on some accounts, to steam power, an irregular supply of water, as in the case of a mill obliged to lose several months in every year owing to a failure of water by drouth, is calculated to have a serious effect upon the profitableness of the mill, and, consequently, upon the moral hazard. Losses on "thunder gust" flour-mills educated underwriters early to the danger of this class of risks. The supply of water should be sufficient to keep the mill in constant operation throughout the year, or steam power should be provided to remedy the defect. An intelligent underwriter will take into account the fact that cheapness of power might be counterbalanced by expense of transportation, so that a steam power manufactory, favorably located for saving freight on materials and on finished goods, might compete successfully with a water power establishment less favorably located.

Belt-Shafts. As already elsewhere explained, the maximum danger of the spread of fire is to be found in conditions which admit of its going from story to story, especially if increased by construction which favors draughts. For this reason, boxes or shafts for carrying belting should be fireproof and so arranged as to prevent fire in lower stories from going into those above. The ideal in construction is where these belt boxes are in a fireproof hallway or tower, the driving pulleys being on the tower side, with the bearing in the wall arranged for oiling on the

mill side, so that the shaft works in a tight box through which fire cannot pass. In many cases belts pass through floors without any protection whatever, or are carried in wooden boxes which are dirty with flyings and ignitible fluff, besides being oil-soaked and liable to burn like tinder.

Electricity. That the use of electricity for lights, heat or power introduces an additional hazard is a matter as to which there is to-day little doubt on the part of men of experience. It has been aptly described as so much liquid fire running through a building from cellar to garret by night and by day. It can, however, be made the safest method of lighting a building or of furnishing power by electric motors, and the net effect for good or evil can only be ascertained by charging it with fires due to its presence and crediting it with the elimination of many things which cause fires. For example, it does away largely with the use of matches; with the danger of swinging gas brackets and the ignition of curtains and draperies blown into flame by the wind; in premises where electricity is used exclusively it prevents explosions from ignited escaping gas; the explosion of lamps, and, to some extent, eliminates candle fires, especially in closets and store-rooms.

Sum all these up, however, and millions of dollars of losses have been due to electrical defects many of which might have been corrected. The great trouble is that wires are installed in buildings in many cases by the most incompetent persons, and even when installed safely are frequently improperly changed afterwards by owners or other employees, who do not realize the danger. A lazy engineer or janitor tired of having "trouble" on a line, will sometimes substitute for a safety fuse a piece of metal of much greater carrying capacity than the wire it is intended to protect.

The National Board of Fire Underwriters, as already explained, publishes a code of rules, which may be secured by writing to the General Agent of the National Board, in New York, and which is kept up to date, being revised from time to time by conventions of engineers who meet for the purpose of considering any new discoveries.

The following definitions of terms may be useful:

VOLT—Is the unit of pressure, or electro motive force (e. m. f.)

AMPERE—The unit of rate of flow of current. A "coulomb" (rarely used) contains the element of time and represents quantity. For example, to express quantity of electricity in a storage battery, it may be expressed in coulombs or ampere hours.

OHM—The unit of resistance.

OHM'S LAW, so called, is

$$\text{Current} = \frac{\text{Volts}}{\text{Ohms}} \qquad \text{Current} = \frac{\text{Electric Motor Force}}{\text{Resistance}}$$

WATT—The unit of rate of flow of energy, and is the product of Volts and Amperes. (1 Volt $\times$ 1 Ampere = 1 Watt.)

KILOWATT—1,000 Watts.

HORSE-POWER—746 Watts. Therefore, a Kilowatt equals, roughly, $1\frac{1}{3}$ Horse-Power, or H. P. equals $\frac{3}{4}$ Kilowatt.

1 incandescent lamp (16 candle-power) uses approximately $\frac{1}{2}$ ampere at 110 volts, or 55 watts rate of flow, which multiplied by number of hours equals number of watt hours.

1 arc lamp uses approximately 500 watts.

It is erroneously supposed that a break in the insulation of wires at single points necessarily means fires by "arcing" or short circuits. This, however, is fortunately not the case. A naked wire in a perfectly dry place may be reasonably safe, but moisture connecting it with another wire or any other conductor would probably produce arcing and a short circuit, but the fuses if properly graded and introduced would probably take care of the trouble. Electrical experts attach more importance to the fuses, and other approved safety devices, than to the insulation of the wire, which does not, however, mean that they do not attach importance to the insulation of wires, as shown by the National Electric Code and its careful specifications as to the amount of insulation, quality of pure Para rubber, &c., &c.

The object of safety fuses is to introduce into the circuit wherever a connection is made between a larger and smaller conductor an approved automatic device of less carrying capacity which will fuse when the current passing through it is in excess of the safe carrying capacity of the wire.

Stringent laws should be enacted prohibiting the installation of wires or electrical apparatus by men who have not passed a thorough examination, to determine their fitness for the task, and it should be a penal offence for a man deliberately to ignore

the rules of safety, especially where such flagrant disregard of danger to life and property is displayed as, for example, in the substitution of copper for a proper or approved fuse as is too frequently the case.

Suggestions to Aid Property Owners in Determining Proper Electrical Installations.

(These have been prepared in pamphlet form by expert underwriters, in order to make clear in simple language explanations of various electrical devices for the use of property-owners. They make the matter so intelligible that I think them worthy to be inserted at this point.

1. Transformers* must not be placed inside of any building, or be attached to the outside walls of buildings unless separated therefrom by substantial insulating supports. The proper place for such a device is on a pole outside.

*A transformer consists of an iron box containing coils of wire usually so arranged as to convert small currents at high pressure into larger currents at a lower pressure.

2. Wires where entering buildings, and elsewhere through walls, partitions, floors, etc., must be separately and properly bushed* with non-combustible, non-absorptive (water-proof) insulating tubes, such as glass or porcelain.

*Bushings are practically tubes made to protect wires where passing through foreign substances. Only non-combustible, non-absorptive materials should be used, and in outside walls they should slant downward toward the outside and the wires entering tube should be provided with drip loops.

3. Suitable switches,* arranged to cut off the entire current, must be placed on all service wires as near as possible to the point where they enter the building; particularly on arc currents where they should be located outside in a non-combustible case easily accessible to police or firemen. Switches must be placed in dry accessible places, and away from easily ignitible material.

*Switches are devices for turning the current on or off. They usually consist of movable copper blades, operated by a handle, so mounted as to secure connection when desired between the service wires from the dynamo and the lights or motors. On some arc light circuits the form of switch used resembles a small box, variously shaped, with a movable handle projecting therefrom; the pushing of the handle to one side or the other shutting off the current.

4. Fuses* must be placed on all service wires as near as possible to the point where they enter buildings, and inside the the walls, also at every point where a change in size of wire is made. Circuit breaking devices, such as switches, fuse-blocks. circuit breakers, etc., must be mounted on non-combustible, non-absorptive, insulating bases, such as slate or porcelain; and they must be located in a readily accessible place in suitable fire-proof and dust-proof boxes so arranged as to prevent sparks or the melted fuse metal from coming in contact with any combustible material. Never replace fuses by copper wire, or by fuse wire too large to properly protect the smallest wire in use; otherwise, when any excess current enters the building, instead of the fuse melting as designed, and disconnecting the circuit, the wires will become overheated, set fire to the insulation, and finally to the building.

*Fuses are protective devices intended to automatically break the circuit in case of an excessive flow of current. They blow out or melt from excessive heat and thus at once stop, at a safe point, the flow of current over the wire. (A fuse has the same effect as a switch except the circuit is completed in the former by fusible strips acting automatically and in the latter by movable copper blades operated by hand.) No fuses of any kind are required on series arc light systems. Ask your light company in case you do not know system in use.

5. Wires not in conduits, must be separated at least one-half inch from surfaces of ceilings, walls, etc., wired over, on porcelain supports (never allow wood to be used under any circumstances) and those of opposite polarity* must be kept *rigidly* at least two and one-half inches apart. In series arc lighting the supports for the wires should be glass or porcelain, and must separate the wires from the surface wired over by at least one inch and wires must be kept at least eight inches from each other. All wires must be kept free—by at least one inch—from contact with gas, water or other metallic piping, or any other conducting material which they may cross, by some firmly fixed non-conductor (such as porcelain tube slipped over the wire), and it is very important that they should never come in contact with any substance other than their insulating supports.

*Polarity refers to the positive and negative wires, i. e., the outgoing and return wires respectively. If they come in contact with each other, or in contact with any conductors, such as metallic piping, a "short circuit" or "ground" is produced, or, in other words, the current

finds a path of lower resistance than the normal circuit, the fuse is blown out and a fire is very liable to occur.

6. Always keep in mind that even the best insulation is liable to fail by abrasion, etc., and therefore in stringing wires treat all as if they were entirely bare and see that they are rigidly fastened. When used in connection with gas fixtures insulating joints must be provided. Wires exposed to injury from any cause, such as moving of cases or barrels in a store, must be protected either by boxing, having an air space of one inch around the wire (in which case the boxing should be closed at the top with the wires passing through bushed holes), or else the wires should have an additional outer covering (of braid, etc.) over the ordinary insulation and be carried through a metal pipe.

Wires in attics or places subject to dampness should be supported on porcelain insulators, or "cleats" (knobs) and hung free and clear of everything else; they should not be carried in wood mouldings.

7. Unsoldered and untaped (not covered with rubber compound or tape) joints are always dangerous. Wires must be so spliced or joined as to be both mechanically and electrically secure; then they must be soldered and the joint covered with an insulation equal to that on the conductors.

8. Arc lamps must be enclosed by tight fitting globes and spark arresters; and all dynamos or motors should be so located that the sparks or small embers which are frequently given off cannot come in contact with combustible material.

9. Never under any circumstances use current from grounded* street car trolley circuits.

*A grounded circuit means a circuit having a ground return. For instance, in a street railway system the outgoing current from the dynamo follows the trolley wire to the point where it is in connection with the ground through a car; the current being transferred through the trolley pole to the motors beneath the car and thence to the axle where it reaches the track, and with this and the surrounding earth as conductors returns to the dynamo.

10. Notify the Insurance Inspection Department having jurisdiction of the territory in which your property is located immediately upon the completion of every piece of wiring or electrical construction work.

11. When giving up the use of electricity, either temporarily

or permanently, make sure that all current is turned off from the building (by opening the switch mentioned in Section 3 above,) and that all interior wiring is therefore "dead."

Suggestions for the Users of Incandescent Lamps.

1. Do not use flexible cord except for pendants, wiring of fixtures and portable lamps or motors. Never use cord for lamps in show windows, or as a support for clusters.

2. Flexible cord should not be hung on nails, gas, water or steam pipes, as insulations are liable to become worn and short circuits result; also avoid tying knots in them.

3. All wiring in show windows for decorative effects should be attended to by a competent electrician, and lamps should be on fixtures only, away from inflammable material. Lamp sockets should never be surrounded with decorations, as they frequently become hot owing to bad contact in the socket or a short circuit.

4. Incandescent lamps give out a dangerous degree of heat, particularly as they get old, and in all cases where there is a possibility of their coming in contact with merchandise they should be protected with wire cages, to prevent their being placed on open stocks, paper boxes, etc., which are often found in a scorched condition from this cause.

5. Never use paper shades or ornament pendants with tissue paper, which may take fire, either from a hot socket or a short circuit, and fall, while burning, on inflammable material.

PRIVATE FIRE EXTINGUISHING APPLIANCES.

Casks and Pails. There should be six filled fire pails, or three fire pails and one filled cask, for every 2,500 square feet of floor area of manufacturing risks. The pails should be of metal, painted red, with round bottoms (*with rims at bottom for easy handling*) so as to insure their being kept in a rack provided for them and unfit them for setting on the floor and being available for other purposes. If one or two pails are judiciously located every 1,200 square feet filled with sand, which extinguishes oil fires better than water, it would be an added and desirable precaution. What promised to be a large conflagration was extin-

guished while the writer was in a building in the city of Hartford, some years ago, by a boy with a pail of water.

I believe fire pails preferable to all other extinguishing appliances, as every person knows how to use them, whereas extinguishers may not be in good order and few persons understand them, some being afraid to use them. It is claimed that the best and simplest arrangement for pails is to nest them under water in the barrel, that each can be taken out full for use and that the pails will not rust if wholly immersed.

It is claimed that chloride of calcium is a better agent for preventing freezing than salt, which is liable to corrode metal buckets.

Chemical Fire Extinguishers. These, if of approved make, containing a sufficient quantity of the material and inspected regularly to see that they are in working order, are desirable, but they are not equal to pails of water for the reason that many persons do not know how to use them, whereas a child knows how to use a pail of water.

Standpipe and Hose. Standpipes for extinguishing fire should be not less than four inches in diameter, although a three-inch standpipe in buildings under five stories high will do good work. They should run near staircases or fire escapes, so that they can be used to the last moment, and hose should be attached at each floor. Standpipes are of little value, of course, unless the water pressure is sufficient to throw a good stream across the room to be protected, and this pressure can best be determined by the simple process of turning on the water. Roof hydrants are admirable and should be provided.

Water Tanks. These should be examined carefully as to the danger of rust in the hoops. It will sometimes be found that a tank is on the eve of rupture, and its failure coincident with a fire would be a serious matter. Of late it has been found that round hoops for tanks, which admit of covering the iron to a greater extent of surface with rust-preventing paint, are better than flat hoops, only one side of which, the outer surface, can be painted.

Watchmen's Lanterns should burn only the best quality of sperm oil. The rules should forbid the watchman opening the lantern for picking the wick or other purposes in the mill. Lanterns

should be so locked that they cannot be opened except with a key kept in the room where they are filled. The bottom should be arranged with hook or other device to prevent its dropping out while being carried in the hand. Lanterns should be properly guarded to prevent breakage and no solder should be used in the framework.

Force Pumps. (See page 453.) Undue reliance is placed by underwriters on the protection to manufactories by city fire departments. In case of conflagrations they are unreliable, and for this reason rates on the class are generally inadequate. Force pumps should be provided, with sufficient private water supply. Had it not been for their own fire pumps Paterson, N. J., factories would have been destroyed by the burning of that city.

Roof Sprinklers. These are admirable. (See pp. 537, 666.)

Organization. Too much cannot be said in favor of a quietly managed but thorough organization of the employees of a large establishment, for the extinguishment of fire. It secures not only the advantage of concerted and harmonious action, but an exemption from panics, and prevents loss of time in an emergency, *when moments are precious and cannot be spared.*

Every employee should understand his duty and post, in case of a fire, and the entire force should be as regularly drilled as are the professional firemen of a city.

NATIONAL BOARD RULES AND REQUIREMENTS.

Agents should write to the General Agent of the National Board of Fire Underwriters, in New York, for the small pamphlets giving up-to-date publications of rules and requirements as to Electrical Wiring and Apparatus, List of Electrical Fittings, Gasoline Gas Lighting Machines, Lamps and Fixtures, Acetylene Gas Machines, Grain Dryers, Fire Doors and Shutters, Automatic Sprinkler Equipments, Chemical Fire-Extinguishers, Wired Glass, Fire Department Hose, Automatic Thermostat Alarms, &c., &c. These have been carefully prepared at conventions of consulting engineers of the National Board, consisting of representatives of the various insurance organizations throughout the United States, thus securing the best expert knowledge of the country—a wise provision of the National Board made originally upon the suggestion of Mr. Henry H. Hall, of New York.

MANUFACTORIES OR SPECIAL HAZARDS.

Having dwelt upon the more dangerous general features of risks and the hazards common in greater or less degree to all manufacturing property, I will now proceed to take up each class in its turn, suggesting briefly those points as to which an insurance company would need information from its agent, who will be saved the trouble of writing explanatory letters later if he reports upon the points referred to on his daily report, or accompanying letter.

Abattoirs. See Slaughter-Houses.

Academies and Private Schools, Colleges, Seminaries and other institutions of learning. These are generally considered good risks, but they are susceptible to two kinds of moral hazard: one, that of mischievous students; the other, that of unprofitableness to the owner. They are, moreover, almost invariably short-insured, so that partial destruction results in total loss to the insurance companies, unless an 80% co-insurance clause is inserted in the policy, as it should be. The tendency, however, is to omit the co-insurance clause. In fact, not long since a movement was actually inaugurated by some college authorities, by the use of circulars to various institutions of learning throughout the country, advising them to accumulate a general fund for the insurance of members for the excess above a uniform amount of insurance to be carried—considerably less than fifty per cent. Under such a scheme the insurance companies would have been paying all of the partial losses, which while partial as to the value of property at risk, would have been total as to the amount of insurance carried. The scheme, of course, failed, because underwriters were not so easily trapped into disregard of the principle of a proper percentage of insurance to value.

Principal Hazards. These are heating, which suggests care-

ful examination as to furnaces, steam-pipes in contact with wood, etc., etc., not forgetting slovenliness as to kindling, hot ashes, etc., in cellars; lighting danger from swinging brackets, carelessness as to matches, etc. These risks very often carry the dormitory and laundry hazards of hotels.

As a rule dormitories where the partitions between bedrooms run to the ceiling are better than those in which they extend only seven or eight feet, as romping pupils at night are apt to throw pillows, shoes, etc., from one room to another, upsetting lamps, etc. Current rates are too low.

Trade schools and colleges of technology involve all of the physical hazards of woodworkers, metalworkers, chemical risks, etc., and should be so regarded. The Company should be advised as to precautions taken as to shavings, forges, soldering pots, chemical laboratories, &c. Those portions of the risk occupied for manual training should be inspected in the same manner as manufactories making the same goods, and automatic sprinklers would be an admirable feature no less necessary in the one case than in the other. In all cases casks of water and pails should be provided to extinguish incipient fires.

Private Country Boarding Schools and Academies. This is an undesirable class of risks. It too often involves a moral hazard growing out of the unprofitableness of the undertaking, which, whether resulting in contrived fires or not, involves indifference to safety. It often happens that an individual will purchase some palatial country residence (which will no longer sell even for the price of a convenient sized dwelling house), or an old summer or health resort hotel or sanitarium is taken, with the result that the school does not prosper. A contagious disease for a single season will sometimes destroy the reputation of the school, and from thenceforward the building becomes a "white elephant." The dormitory and laundry hazard is frequently equal to that of a summer hotel. The values in the case of adjustments would be unsatisfactory, and it is best to decline them.

Acetylene Gas Plants. Refer to Company with full particulars before binding. Get rules of the National Board of Fire Underwriters as to installation.

Acid Works. These are often nuisances to a neighborhood and should be carefully considered from this viewpoint. They

tend to depreciate the values of surrounding property, especially for dwelling purposes, and owners of adjacent land would rather see them burn, especially if in the vicinity of a city whose growth would make building lots valuable but for such nuisances. The physical hazards are connected with furnaces and combustion in such towers as the Glover and Guy Lussac, use of concentrators, sulphur, saltpetre, &c. It is not generally known, as is elsewhere stated, that empty saltpetre bags are liable to ignite spontaneously if exposed to the sun. Advise Company fully as to the hazards mentioned.

Adze Manufactories. Same hazards as Hardware Manufactories. Report fully as to the woodworking of handle making, if any.

Agricultural Implement Manufactories. Advise Company as to location of boilers, which, as in the case of all woodworkers, should be outside, where fires caused by back drafts would not endanger the main values; as to paint-shop, if benzine or naphtha dryers are used, as is generally the case; dry-rooms, as to arrangement of pipes, painting, varnishing, etc. This class should be fully protected by steam jets, automatic sprinklers, fire pails and casks of water.

Woodworking and painting hazards predominate in most factories of this kind and are generally not properly considered in rating, a fact which has made this class unprofitable.

Agricultural Implements, Stocks of. A moral hazard is frequently involved in these by reason of accumulations of machinery which has been superseded by later patents. Such stocks are frequently utterly valueless because unsalable. The class has not been a profitable one at current rates of premium because so largely consisting of painted and oil finished wood subject to a quick fire.

Album Manufactories. Advise Company as to gluing, binding, &c., &c. They are about twenty-five per cent worse risks than bookbinderies.

Alcohol Distilleries. These usually manufacture alcohol from purchased "high wines." About two gallons of high wines will make one gallon of 95% alcohol, which is the highest grade of commercial purity, absolute alcohol being used only for

chemical purposes and the percentage raised by quicklime, etc., etc. Where high wines are purchased the risk is, of course, free from the danger of grinding, malting, etc., incident to whiskey distilleries and is practically only that of re-distilling the high wines. Advise the Company as to furnaces, still and precautions as to storage. The manufactured alcohol in barrels should be entirely separated from the danger of the distillery portion by warehouses so located that they could not be burned by the burning of the distillery. If high wines are manufactured in connection with alcohol works the rate should be that for ordinary distilleries.

Alcohol, Wood. This process involves woodworking and the reduction of wood to small pieces almost in the form of sawdust, the roasting and distilling hazard, the production of creosote oils as "by-products", carelessness in the storage of unslaked lime, fire heat in the retorts, the handling of charcoal, leakage and explosion of stills, &c. There are few insurable risks of the class even at high rates, and they must not be bound without consulting the Company.

Almshouses. New, brick, model-planned ones are reasonably good risks, but the class as a whole has been unprofitable at current rates. They are certainly worth as much as frame summer hotels and involve also steam laundry hazards. They should be referred to the Company before binding. There is no reason why they could not be made safe and profitable, but they are usually carelessly managed, in some cases being in charge of the most incompetent and unprincipled persons, indifferent alike to humane considerations for inmates and to safety from fire. Insane patients are frequently kept, and inmates of this character have been known to set them on fire. These risks are usually connected, in the country, with a farm, and the barns and outbuildings are carelessly managed as to lanterns, open lights, smoking in barns, &c. Barns become lounging places for inmates.

Animal Black, Animal Charcoal and Bone Black Manufactories. Few companies write these. It is difficult to compute a proper rate, and we prefer to decline them.

Armories and Arsenals. These are supposed to be exceptionally good risks. Fires originate in them usually from careless-

ness of soldiers with cigars, cigarettes, &c. They are of large area for drills, and although frequently as substantially built externally as forts they contain enormous quantities of combustible woodwork in the shape of floors, partitions, lockers, etc., internally.

The Armory of the Seventy-first Regiment, Park Avenue, New York City, was destroyed by fire in February, 1902. It was a complete wreck, although the appearance of the building externally indicated most massive construction, of granite blocks. From the viewpoint of affording proper protection in the event of riots, &c., they should be of fireproof construction.

Artificial Flowers, Feathers and Millinery Manufactories. The chief danger of these risks is in the ignitible character of the stocks, their great susceptibility to damage by smoke, water and fire, heavy depreciations in value by changes of fashion and style and the fancy values claimed for in case of loss. They are not desirable risks except in the hands of honest and careful people and then only at full rates.

Asbestos Manufactories. These would naturally be supposed to be good risks, and are if properly constructed and managed on lines already suggested for risks generally. There are not many in the country, however, and, like all other so-called "fireproof" risks, they seem to burn. In the past five years fires have occurred in these establishments, causing enough losses to destroy the profit on the class.

Asbestos cloth manufactories use a small percentage of cotton, which, although sometimes burned out afterwards, is a hazard while in process of manufacture equal to that of a cotton mill.

Asbestos cement factories use lime, and asbestos paper mills have many hazards which are far from fireproof, while asbestos paint-mixing and roofing material factories are practically paint risks and should be rated as such, especially when benzine is used.

Asphalt and Roofing Material Works. These have been exceptionably unprofitable, and the physical hazard of melting asphalt, tar, etc., is a serious one, and fires once started are difficult to extinguish. They should not be written or bound in any case without first obtaining the consent of the Company, after full advice as to the use of fire and precautions for extinction, etc.

Asylums. Those for the deaf, dumb, blind, aged and orphans are usually good risks at a fair rate, with 80% co-insurance. Insane asylums should rate 50% higher.

Auction Stocks. Decline; values unsatisfactory.

Automobiles. These must not be insured without the consent of the Company first obtained. Where gasoline is used for motive power the rules of the National Board should be complied with. The best method of storing gasoline for supplying the machines is to have an iron tank holding between two and three barrels, or slightly more than one barrel where the gasoline is purchased one barrel at a time, buried under ground with a vent pipe near the surface and a gauze vent on the Humphrey Davy principle, with a pump for pumping out the gasoline. The tank should be well covered with earth, which tends to prevent an explosion by preventing the accumulation of vapor, as would be the case in a vault. Some of the automobiles in use to-day are of such large value as to make their insurance undesirable —too much risk is concentrated in too small a space—on the same principle explained as to the undesirability of insuring very valuable race horses with one pair of lungs to be suffocated.

Axe Factories. These are good risks as a class, but are generally short insured, the owners retaining the best end of the risk and insuring only the woodworking, handle-making portion, &c. The Company would need advice as to the latter hazard on the points indicated for woodworkers. The rates are too often based on the metal hazard instead of on the woodworking and painting hazard.

Bag Factories. Cotton Cloth. These ought not to be particularly dangerous in the hands of careful, cleanly people; but owners are often negligent as to accumulations of clippings, sweepings, etc.

Bag Factories. Gunny Bags. Coffee Sacks. &c. These are more hazardous than cotton cloth factories and should rate at least 50% higher. It is necessary to inspect carefully as to cleanliness. Ignitible flyings are frequently allowed to accumulate on shelves and ledges and on the bearings of sewing machines, shafting, &c., where they can find a resting place, and sometimes on the top of stovepipes running horizontally, where they might not be noticed until ignited. Advise Company fully as to the use of

fire, lighting arrangements (open lights should be prohibited) and cleanliness.

Bag Factories. Leather. Traveling. Etc. (No trunk making.) Stock is damageable by water and smoke; leather when discolored by smoke or water is often claimed to be unsalable.

Bag Factories. Paper. This class has been unprofitable. They are generally dirty and carelessly managed, and the stock and material are easily ignited.

Bakeries. These risks are particularly dangerous where the mouth of the oven is in a basement under wooden floor beams of the story above. The room opposite the oven should be fireproof, with brick floor and brick arched ceiling. The oven of a bakery should always be outside of the building, where it cannot endanger the larger values. There should be a clear air space around sides and top of ovens. Accumulations of empty flour barrels, pasteboard boxes, &c., frequently lead to bad fires. Doughnut and cruller stoves are liable to cause fire by the boiling over of fat and its ignition.

Baking Powder Manufactories. Advise Company as to boiler rooms, heating, lighting, dryrooms, packing materials, arrangement of floors, as to cut-offs one from another and construction of buildings.

Bamboo Furniture Manufactories. These ought not to be bad risks, but the class has been unprofitable. Advise Company as to heating, lighting, cleanliness, etc.

Bark Mills. These are usually connected with tanneries. They are peculiarly dangerous because of the ignitibility of the ground bark and its stubborn retention of fire when once ignited; in fact, it is almost impossible to tell when a fire once started in a bark mill has been thoroughly extinguished; the fine, dry powder, like punk, retains the fire and allows it to spread insidiously out of sight until long after it is supposed to be thoroughly wet through. The ground bark should drop into water and be floated to the leaches instead of being stored dry. All level surfaces, like the upper surfaces of beams, ledges, &c., should be avoided, as they tend to collect ignitible dust and lead to the spread of fire throughout the entire structure. Steam jets are admirable fire appliances for bark mills, and automatic sprinklers would also be desirable.

Bark. Piled near tannery, should pay tannery rates. If piled in woods, should be regarded as uninsurable. If near railroad, it is liable to the spark hazard and should pay not less than five per cent, with the location described and limited in the policy. Policies should never cover bark distributed along railroads.

Barrel Manufactories. Advise Company as to location of boiler rooms, arrangement of furnaces, kilns, use of shavings or refuse for fuel, charring process for charring the insides of barrels, blacksmith-shop, etc. The finished material, manufactured barrels, shooks, etc., should be stored where they will not be subject to the fire hazards of the manufactory. Automatic sprinklers are of little value in a barrel factory because the water is not apt to reach ignited surfaces of barrels in the lower portions of a pile. Inspect and report on all of the above hazards.

Baseball Ground Buildings. Decline.

Basket Manufactories, Willow-ware Manufactories, Etc. The finished stock is damageable by fire, water or smoke, and the whole risk belongs to the class in which fires rapidly spread. The stock is an objectionable one to insure, as discoloration by smoke results in excessive claims, unless the owners are exceptionally honest. They should pay full rates and the Company should be advised as to fires, lights, drying, cleanliness, etc.

Bath Houses, City. Turkish, Russian, etc., should be examined carefully for steam-pipes in connection with wood and as to arrangement of dry-rooms, as to which Company would want advice.

Bath Houses at lake and seashore resorts. Are often of cheap construction and have little insurable value. At hot springs, health resorts, etc., they should be regarded from the moral hazard viewpoint of permanence or experimental character of the place. They, of course, become utterly valueless if the resort ceases to be popular. The laundry and drying hazard may be serious.

Bath-Tub Manufactories. Report fully as to enameling processes, heat, boilers, etc.—the usual hazards of metal workers.

Batting and Wadding Manufactories. These are usually uninsurable. They are particularly liable to fires owing to the character of the material used, which is not only liable to ignite easily, but is of doubtful cleanliness; and they have the physical hazard of

picker work, &c. All lights should be covered and so arranged that they can be lighted from the outside of the building, the light entering the building through glass, without an opportunity for material to be blown in contact with the flame or for ignitible fluff to accumulate in the lamp, especially in the card rooms. They should not be insured in any case without first obtaining the consent of the Company after full survey and advice.

Bedstead Manufactories. Wooden. Same as Furniture Manufactories, which see. If brass or iron, advise Company as to fires, painting, enameling, shellacking, lacquering, buffing, cleanliness, drying, etc.

Bell Manufactories. See Brass Manufactories.

Bellows Manufactories. Same as Woodworkers.

Bicycle Manufactories. These involve woodworking, metalworking, screw cutting, brazing, buffing, japanning, enameling, electroplating, rosin kettles, oil and grease hazards, vulcanizing and crate making, with often a moral hazard, because the risks as a class have been unprofitable to their owners; new patents have superseded less desirable and salable types, and values rapidly shrink where this is the case. They are not desirable risks and sometimes involve considerable woodwork, reslitting saws, etc.

Billiard Table Manufactories. Same as Furniture Manufactories.

Blacking Manufactories. Shoe. Advise Company as to boilers, heating, storage and use of lamp-black, oils, etc. An undesirable class on account of the use of lamp-black and oil.

Blacking Manufactories. Stove. These are undesirable risks, especially where naphtha is used. The Company will want full advice as to use of fire heat, use of naphtha, lamp-black, etc.

Blacksmith-Shops. These are good risks in the hands of honest men—and most blacksmiths are honest. If wheelwright and woodworking are connected, a higher rate should be charged, according to the hazard. See that forges are safely arranged. They should not adjoin wooden partitions or wooden sidewalls.

Blast Furnaces. Where properly constructed, the physical hazard is not serious. The roof over the casting floor should be of iron. If of wood it should not be so low as to be ignited in case of an explosion or "boil" of the molten metal. Great care should be observed in the storage of charcoal. An intelli-

gent investigation should be made as to the supply of ore, of limestone for flux, coal, fuel, &c., in order to see that the furnace is so located as to compete successfully and economically with others. It may be so handicapped in these respects as to be a worthless asset to the owners.

Blanket Mills. (See Woolen Mills.)

Bleacheries, Dye and Print Works. Dry-rooms should be carefully inspected and risks should be declined if steam-pipes are in contact with wood, or if the steam-pipes are so arranged as to collect flyings or have material above them. Where singeing or napping is done over an iron flue, it should be outside of the main structure and in charge of a careful man, not entrusted to boys. If benzine is used as a mordant in calico printing inquire as to quantity used and how it is used. The storage of chemicals used and compounding should be looked into and reported.

Blind, Sash and Door Manufactories. These have all the hazards of carpenter-shops, planing-mills, saw-mills and paint-works; the process tending to produce fine dust, shavings, etc. The paint used is often a cheap quality of naphtha thinned paint and is applied wholesale by dipping and other processes, and dangerous vapors are generated. As a class they have been very unprofitable. Full rates should be obtained and great care observed in inspecting the boiler-room, dry-room, glue-room, paint-room, etc. The Company will want full advice before accepting the best of the class.

Block and Pump Manufactories. These are not serious hazards, often involving hand work with axes, etc., but the values are small. They need the careful inspection of woodworking risks.

Boarding Houses. These are good risks in cities, provided they are not on the scale of hotels at boarding house rates. Where they are of a temporary character, erected of cheap lumber, &c., for the employees of contractors on railroad, dam, bridge work, etc., they have usually cheap, temporary flues and the common fault of stovepipes passing through the side walls and roofs; the hazards of smoking, often of shiftless and drunken men; straw mattresses in dormitories, &c., and should be regarded as uninsurable.

Boat Builders. These are good risks if carefully managed. Advise the Company as to any planing or saw work; if steam

is generated the use of shavings under the boilers involves the usual planing-mill hazard.

Boats and Boat Houses. If unexposed, these are good risks at fair rates, whether in connection with hotels or club houses. Private boat-houses connected with dwellings are, of course, better risks, and may be taken at the barn rates of the property-owner where gasoline or naphtha for launches is not stored. See Automobiles for storage of gasoline.

Boating and yachting clubs are fairly good risks at full rates, but in the case of hunting and fishing clubs care should be taken to learn the hazards of forest or grass fires and any question of moral hazard growing out of the enmity of neighbors who object to being excluded from "preserved" streams or forests and in consequence of differences or quarrels with the club officers may set fire to buildings out of spite. It is best to decline hunting and fishing clubs. The construction, especially of flues, is often so poor as to make the physical hazard objectionable, to say nothing of the moral hazard.

Bobbin and Shuttle Manufactories. Principal danger in addition to that of regular woodworking mills is due to the friction of the long and rapidly moving bits employed. The wood shavings and turnings often become ignited by friction and they are liable to spontaneous combustion unless great care is exercised as to the use of oil. Like all other woodworking risks, the company will need full advice as to the care taken, etc.

Boiler Makers. These are good risks at fair rates, where the buildings are of a substantial character, and not of cheap construction or low roofs.

Bolt and Nut Works. For some reason these have been unprofitable risks. The numerous fires have been attributed to the oily sawdust used in cleaning processes, while many fires are unquestionably due to the rusting of iron filings and to the extensive use of oil, &c. Possibly these causes may have had something to do with the mortality in the class. The Company will want careful advice as to the tumbling barrels, the prosperity of the owner, general condition as regards oil and grease, &c., &c.

Bone-Black, Ivory-Black and Animal-Black Manufactories. These are hazardous risks owing to the danger of spontaneous com-

bustion and the processes, and should not be insured without first obtaining the advice of the company after full particulars and survey. Inspect and report as to furnace hazard and storage of manufactured material.

Bone-Boiling Establishments. These are so objectionable as nuisances to all neighbors that few companies care to write them.

Bone Mills. These are usually nuisances and should be declined.

Bonnet and Hat Frame Manufactories. Advise fully as to the processes, care taken, the bleaching department, &c., &c.

Bookbinderies. These have been unprofitable risks at current rates and as usually managed. Benzine is often carelessly used; the heating of glue is usually unsafely arranged; paper clippings and other rubbish are allowed to accumulate around steam-pipes or near stoves, and the employees—usually boys and young girls—are frequently careless and indifferent to danger. Not a few fires occur from the putting away of greasy rags in drawers where they ignite spontaneously. Where these establishments, as is frequently the case, are on the upper floors of buildings, little or no salvage is to be expected in case of fire. There are few companies who would not prefer to decline them at ordinary rates.

Boot and Shoe Factories. See Shoe Factories.

Box Factories. These partake of the hazards of planing-mills, saw-mills, dry-rooms, &c., &c., and should be inspected with reference to such dangers. No company would wish to insure a risk of this character unless exceptionally clean and well managed. Do not bind the company without submitting the risk, with full explanation. The majority of the class are of cheap construction, of uncertain profit to their owners, and employ a cheap class of careless hands, whether wood or paper boxes are made.

Paper box factories involve most of the hazards of binderies and printers, improperly arranged dry-rooms, careless heating of glue, etc., etc.

Brass Works. These involve the hazards of casting, and require care as to patterns, fallow-boxes and moulds, which are liable to be stored when too hot. Advise as to fire heat used, buffing, lacquering, enameling, etc.

Breweries. These are good risks if properly constructed and carefully managed. The malt house, if any, should be thoroughly cut off from the brewery proper, and care should be taken in insuring the brewery to secure a co-insurance clause. Report on location and arrangement of malt mill; the mill should be equipped with magnets to catch nails, etc., and an automatic explosion vent; steam jets, both in mill and elevator legs, are also a valuable protection. If spent grain drying, report carefully on arrangement of apparatus and storage of material.

"Pitching" should be thoroughly cut off and kettles should have covers, and be so protected as to prevent pitch from getting to the fires if they boil over. Pails of sand are desirable for extinguishing pitch fires. Electric lights are preferable for use when varnishing the large tubs and casks.

The kilns should be constructed of brick or iron throughout with no woodwork exposed to fire. Where any portion of the kiln is of wood, they are, of course, not so safe, though many are still constructed with woodwork resting on brickwork. The company would do well to decline them, however. The fine dust sifting from the grain through the drying floors of the kiln is very combustible and should be regularly removed. The kiln should be so constructed that this dust, sprouts, etc., cannot fall upon the fire in the furnaces, which should be covered with an arch of masonry or hood of sheet iron so that they would fall to one side and not become ignited, thus setting fire to the grain above.

If barrels are made on the premises a higher rate should be charged, and the company should be fully advised as to process. For rules of inspection see Barrel Factories.

Brick Manufactories. These are often constructed of cheap boards, warped by the heat of the kiln and of the sun, and so thoroughly dry as to burn like tinder. The values are small and there is great liability to overinsurance. The better class of brick factories are of substantial construction, with the roof so arranged that it can be moved from over the kiln when burning brick. Decline the cheap, dilapidated class, and always report carefully on the construction and arrangement of kilns, dry-rooms, etc. In modern factories the steam drying hazard is

often serious. Scrutinize moral hazard as regards the exhaustion of clay deposit. Usually a poor class of help is employed.

Bridges. These are of various classes. Covered railroad bridges of wood, covered free bridges, covered toll bridges, open or deck railroad free, open or deck toll bridges. Decline old wooden bridges liable to burn to make way for modern steel structures.

Broom Corn Warehouses and Barns. These have been unprofitable to companies; whether because of a moral hazard involved or of liability to spontaneous combustion from overheating of fibre with the oil expressed from the corn, or otherwise, the class has been decidedly unprofitable. We prefer to decline them.

Broom Manufactories. These are not good risks, unless exceptionally well constructed and with the hazards subdivided. Report fully as to the fires used, gluing, handle-making, painting, varnishing, bleaching, &c.

Brick Kilns. See Brick Manufactories.

Brush Manufactories. Report fully as to use of fire heat, handle-making and extent of woodworking, gluing, drying, pitching, varnishing, &c. If pitching or glue work is inside, 50 cents should be added to the rate, even if safely arranged.

Bucket and Pail Manufactories. Metal. Advise fully as to soldering, use of fire heat, boiler, painting, japanning, etc.

Bucket and Pail Manufactories. Paper. Advise fully as to process, manufacture of pulp, material used, fire heat, etc.

Bucket and Pail Manufactories. Wood. These have been unprofitable risks at current rates. They involve the hazards of turning and of woodworking, cutting and sawing generally, use of heat in the drying room, painting, varnishing, etc. Company will want full advices as to these hazards.

Builder's Risks. These are desirable in order to secure the building when finished, protection being necessary while in process of construction. As already stated, the policy should cover the builder and the owner, with loss if any payable as interest may appear, to prevent double insurance and a moral hazard, and also to prevent disputes in case of loss. (See page 129.)

Building Materials. Lime, hair, cement, etc. See Lumber-Yards.

Burial Case and Coffin Manufactories. Metal. These are less hazardous than wood case manufactories. Advise fully as to various processes, varnishing, boiler-room, &c.

Burial Case and Coffin Manufactories. Wood. These are little better than furniture manufactories. Advise fully as to gluing, varnishing, shellacking, sawing, planing, drying, boiler-room, etc.

Cabinet and Furniture Factories. Few classes of risks are so inadequately rated as these. They combine the hazards of planing, wood and shavings fuel, varnishing, gluing, sawing, and almost every dangerous process incident to woodworking. Small, hand-power shops are better risks. There is no reason why the larger shops should not be constructed with reference to safety, having division walls between the various processes, especially separating the more dangerous ones from the other values. Advise the company fully as to the boiler-room, glue pots, sawing, planing, &c., &c. Special attention should be paid to the upholstering department. If pickers are used for tearing material they should be entirely isolated. Otherwise all the danger of the prohibited part of a cotton-mill or a jute factory may be found, without the safeguards which are incident to the class named.

Camp Meeting Ground Buildings. (See page 61.)

Candle and Soap Manufactories. These, as a rule, are undesirable and should be declined. They are frequently regarded as nuisances in a neighborhood, and have not been profitable as a class. Some of the modern soap factories where no rendering is done, constructed with reference to economy of output and safety from fire, are exceptions to the rule; but they are not numerous.

Candy and Confectionery Manufactories. These have not been profitable, and the stock is specially susceptible to damage by smoke and water in case of fire, and is too frequently a total loss. The line should be small. Explosions have occurred in them from the use of flour and starch dust and from some of the essences employed. One of our New York establishments was thoroughly wrecked, some years ago, by an explosion of dust which was never fully explained. Report carefully as to setting of candy furnaces, batch-warmers, roasters, dry-rooms, &c.

Cane Manufactories. Advise as to gluing, varnishing, shellacing, drying, bending, and any use of fire heat.

Canning Factories. These have not been profitable as a class. They have the hazards of soldering, tinning shops, gasolene soldering pots, &c., &c., and are generally located beyond the reach of fire departments. Full rates should be obtained and the company should be consulted before writing. It is vitally important to know if supply of vegetables, fruit, fish, etc. is permanent or unreliable. Often of cheap construction and not permanent.

Cap and Hat Manufactories. (See Hat Factories.)

Card Clothing Manufactories. No general suggestion is necessary for the inspection of these risks. They have only ordinary hazards and should pay full rates. The stock is usually claimed to be a total loss because of rusting of wires, etc.

Card (Playing) Manufactories. They have all of the hazards of printing and lithographing establishments and should be inspected and reported upon as such. The rules for inspecting boiler rooms for cleanliness, &c., need to be observed. If properly managed the processes ought not to be hazardous. The stock is a damageable one and full rates should be obtained on it.

Car Stables or Barns. Horse and Street Car. Advise fully as to the number of cars that can be stored in the various buildings covered, and as to heating, whether by stoves or electrical apparatus. An important fact in insuring cars in cities is too frequently overlooked; insurance is often sought for a less percentage of value at risk than is proper, the company relying upon the number of cars that would be outside of the various shelters at the time any one should burn. While the rate is usually based upon the expectation of the cars being outside of the car barns for a large percentage of the twenty-four hours, there are, in fact, generally cars of value to the full amount ot the insurance in the car barns and often on the upper floors, where they could not be run out. This is especially true of lines running summer and winter cars. During summer, the winter cars are all inside and probably upstairs; during winter, the summer cars are upstairs; and the insurance companies would probably have a total loss unless with a full co-insurance clause. Be careful to estimate storage capacity of the barns. Advise Company fully

as to motive power, horse or electric trolley or storage battery, or gasolene motors. Very often repair shops are connected and the various hazards found in them should be reported on in detail.

Car Manufactories. Full advices as to the woodworking hazards, planing, sawing, gluing, upholstering, &c., will be needed by the Company. Like most combined wood and metal workers the rates have been too low on them, the wood-working hazard having been underestimated.

Carpet Cleaning Establishments. These are invariably nuisances and disliked by neighbors, and under no circumstances should a policy be issued without the consent of the Company first obtained—and it would be difficult to get this consent. Benzine and naphtha are likely to be used in large quantities, and this should be carefully investigated and reported upon.

Carpet Lining Manufactories. These should be rated and treated as wadding and batting mills.

Carpet Manufactories. (See Cotton and Woolen Mills.)

Carpenter Shops. The large steam power establishments, using planers and circular saws, should be classed as to rates and hazards with sash and blind factories. Small, hand-power shops, unless they have, as is too frequently the case, a stovepipe passing out of the window or through the roof, or the stove is unsafely arranged inside, are good risks at a fair rate. Old stoves with cracks in them are too frequently to be seen in these risks, and lumber is not infrequently left standing against stovepipes to dry. Advise the Company fully in the case of the large shops before binding.

Carriage Shops. These vary as much in hazard as they do in size. Where well managed and arranged they are not bad risks, but require full rates. The use of linseed oil makes them especially liable to spontaneous combustion, and a careful examination of closets and out of the way places is necessary on the part of the inspector. In fact, in risks of this character there ought not be any closets or concealed places.

Cartridge Manufactories. These have, in addition to the hazards of metal-workers the serious hazard of loading. Owners, are, as a rule, impressed with the necessity of isolating this process. It should be far enough from the main structure to prevent damage to it by explosion or fire.

Celluloid Works. This process is so dangerous that it is best to let it go uninsured It is manufactured from guncotton and camphor, and it is claimed articles made from it, such as combs, billiard balls, trusses, etc., take fire sometimes spontaneously, ignite almost like powder, and are so inflammable that a large volume of water seems only to add to the intensity of flame and heat, and the fire spreads so rapidly that little money can be made by underwriters assuming the hazard. There are different grades manufactured, some being susceptible of ignition at a very low temperature. The stuff is explosive during the process of manufacture, and if confined and subjected to heat. The presence of the manufactured material in large quantities makes such establishments subject to very quick total destruction in case of fire.

Cement Mills. These ought not to be unprofitable risks, but they have been at rates of 3%. The great hazard is, of course, the furnace hazard in the burning of the material, and there is also the hazard of grinding it, which makes a large amount of dust which is likely to accumulate on the bearings and result in hot boxes unless they are very carefully arranged to protect them from the flying dust. Recently the hazard of pulverizing coal for fuel has been introduced into these risks. It is claimed that this process has burned several of them, the hazard being that of pulverizing bituminous coal and blowing it into the kilns under air pressure, which is claimed to create a bad explosion hazard, and at any rate the accumulation of fine particles of pulverized coal, I should think, would create a spontaneous combustion hazard. There should positively be no flame lighting in the coal preparing department, and it should be thoroughly ventilated. While the process is not necessarily a dangerous one, yet fires have been so numerous as to lead to a suspicion that there is an undiscovered hazard in the class. The Company will want full and explicit advice before issuing the policy.

Chair Manufactories. These have the hazard of turning shops, saw-mills, planing-mills, shavings for fuel, boilers, and the additional hazard of dipping the chairs bodily into tanks of paint and varnish in which cheap naphtha dryers are used. A fire in such a room would spread rapidly and get beyond control. It will be observed that the manufactured chairs are usually

wrapped with paper and excelsior and then stacked in storerooms in the worst possible shape for a fire to spread. If a fire once starts there is little chance of its being extinguished. Full rates should be obtained and the Company advised fully before binding.

Chandelier Manufactories. (See Gas Fixture Manufactories.)

Charcoal Grinding. Process is a dangerous one and the risks should be declined.

Cheese Factories. It is safe to refer these to the Company with full particulars as to fires used and carefulness of management, and as to whether owner manufactures from his own dairy or for farmers generally. It is claimed that factories owned or operated by corporations or associations are not so desirable as those owned and operated by single individuals. Boiler and chimney arrangements should be carefully inspected and reported upon.

Chemical Works. These should be referred to the Company with full information as to the class of chemicals manufactured. They are frequently nuisances and so regarded by neighbors. The furnace hazard exists in them to an unusual degree, and the construction of the furnaces and chimneys should be carefully inspected and reported upon.

Chocolate and Cocoa Manufactories. These are usually saturated with cocoa-nut oil from top to bottom and burn like tinder. Cleanliness should be required. The roasting hazard exists in these factories to about as great an extent as it does in coffee roasters, and they should be arranged in the same way as is required in such risks and the same arrangement should be had for the handling of the hot beans after roasting. All other hazards are ordinary in character and need no specific suggestions to an intelligent agent.

Churches. The chief hazard, of course, is the furnace and heating apparatus. It is particularly important that furnaces and hot air pipes should be carefully inspected and the risk declined unless they are arranged in a perfectly safe manner, there being a proper clearance between the top of the furnace and the nearest wood, and also between the hot air pipes and any wood that may be near them; the great danger in these risks is that they are left alone so much, fires being started in cold weather

when they are to be used, and forced so as to heat the building, making the heating apparatus much more dangerous than where it is in use continuously. It should be remembered that steam pipes must not be in contact with wood. Examine the basement particularly to see whether the janitor is careful as to handling wood, shavings and other fuel. The valuable paintings, tapestries and laces of the altars of Roman Catholic churches make losses on these more serious than in the simple structures of Presbyterian, Methodist and Baptist Churches. In the large cities, however, some of these, especially Episcopal churches, are ornate in their fresco work and finish.

The organ in the church should not be separately insured, unless by some other company than the one who furnishes this Instruction Book. The most equitable way of insuring the organ, which is particularly liable to damage, is to distribute the insurance on it among all of the companies taking the building.

Cigarette Manufactories. These should be declined at ordinary rates. They need full rates, the most careful inspection, and any company insuring them will want full advice on all points of danger.

Cigar Manufactories. These are seldom found outside of towns. They ought not to be hazardous, with reasonable care, but the stock is particularly liable to damage. If cigar boxes made, inspect and report as for woodworking. Dust explosions are incidents of these risks and should be guarded against.

Sweat room hazard; inspect carefully, especially as to setting of stoves, &c.

An explosion occurred in the shavings vault of the William Wicke factory in New York, destroying large values. Another in the cigar box factory of Sheip & Co., Philadelphia. In the latter case the door at the bottom of the shavings shaft was directly facing the furnace doors of the boilers. In this risk the hazard was improved after the explosion by carrying the explosive Cyclone Separator dust through metallic conductors to a tank of water on the roof of the factory.

Cleaning and Dye Works. These use naphtha and benzine in such quantities as to make them undesirable. There are exceptions to the class, however, and there is no reason why they

should not be so constructed and the dangerous processes so isolated as to admit of the latter burning out without damage to the larger values. The drying hazard is the most serious; inspect carefully and report fully.

Cloak and Mantilla Manufactories. These have not been profitable as a class, and great care should be taken as to moral hazard. A company is liable to extravagant claims on the part of dishonest parties; a small hole burned in a garment is often urged as a reason for treating it as a total loss. The pressing hazard, heating of irons, etc., are serious.

Clock Manufactories. These may involve both metal and wood working hazards, and need to be examined as to both, and the company fully advised. Buffing hazard serious. Japanning with metal cases is serious feature.

Clothing Manufactories. These ought to be good risks, but they seldom are, and loss claims are large, especially where one garment in a suit—a vest, for example—if injured is made the basis of a claim for total loss on the entire suit. Full rates should be obtained. Careful inspection is necessary to detect carelessness in the iron heating department, and the Company should be fully advised. Where cloth is cut by electric power the rules of the National Board must be followed.

Club Houses, City. These are not good risks as a rule. Adjustments usually bring hard feeling unless exceptionally high prices are paid for dishes, furniture, &c., as members of the club, without personal knowledge as to facts, often form erroneous impressions from reports of employes as to the fairness of the company. They approach very closely to the hotel hazard and should be rated at about the same figure.

Boating, Yachting, Hunting and Fishing clubs should be examined as to forest fires, or of possible enmity of neighbors of a poaching disposition where hunting and fishing on preserves.

Coal Breakers. Be sure there is a coal mine at the foot of the breaker. If the supply is exhausted the breaker is worthless. The company will want full advice before issuing policy.

Coal Mine Property, Pockets, Miners' Dwellings, &c. Have not been profitable as a class. To pick out good risks needs great care, common-sense and good judgment. Decline if exposed by slack washing. Be sure there is supply of coal.

Coal Oil Refineries. Decline.

Coffee Roasting Establisments. The stock is usually a total loss, and the buildings are usually carelessly built. The cooling and drying troughs should be of metal. The coffee roasters should be on a fireproof floor. Frequently they rest upon bricks laid on top of an ordinary wooden floor. Fire is certain to occur in this class sooner or later. Unless standard, they should be declined, and even then full rates should be obtained.

While the coffee roasting portion of the risk is very hazardous and should practically be in a fireproof room, it is a fact that fires have started more frequently in the mill room than in the roasting room, probably due to the fact that the physical hazard is apprehended and guarded against in one place and lost sight of in the other. The mills should be of iron and not of wood. Many fires have been caused in this room by the tobacco smoking of operatives. Roasters that remove from the fire are safer than those that draw out. Coolers should be of iron with facilities for daily cleaning. Wooden troughs and other than metal coolers are unsafe.

Coffin Manufactories. (See Burial Case Manufactories.)

Cold Storage Warehouses. The physical hazard of these risks is not great, but there is danger of a large loss where systems of warehouses are dependent upon one source of supply for the refrigerating material. The New York Fire Insurance Exchange has endeavored to provide for this consequential loss by requiring that where the clause is used making a fixed liability on merchandise for consequential losses resulting from the destruction or disablement of machinery, the policy must specify the location of the building containing the machinery referred to, and the rate on the insured property must be equal to the combined rates on contents of both buildings. It may happen that the pipes after leaving the refrigerating plant pass through a number of other buildings whose destruction would intercept the process and allow the merchandise to spoil. It is clear that in such cases a company insuring the merchandise would be carrying the risks of all the buildings whose destruction would interfere with the process and should, therefore, have a high rate. Unless specifically assumed in writing on the policy, a company would not be liable for a loss due to a change of tem-

perature owing to any interruption of the process, but it is best not to rely entirely on this exemption from claim, as hard feeling would result in case of loss and claim denied. (See index for forms.)

Interference by Boards of Health, condemning food products, has sometimes caused total loss where there was actually small intrinsic damage. Rates are rarely adequate for contents of cold storage warehouses. In some cases the stock would be no more desirable than the plants in a greenhouse.

Colleges and Academies. (See Academies.)

Confectionery Manufactories. (See Candy.)

Cooper Shops. The large, steam plants are dangerous special hazards, unless constructed with reference to division of the danger by separating the various departments. The company should be fully advised before issuing the policy, concerning these points, location and arrangement of kilns, heaters, &c., extent of woodworking and general condition.

Copper Stamp Mills. (See Stamp Mills.)

Cord Wood. This should not be insured. It is usually piled in the woods where cut or along railroads, subjecting it to the spark hazard, and is almost invariably exposed to running grass and brush fires. No obtainable rate is likely to pay the cost of insuring it.

Cork Manufactories. The grinding process should be separated. Fires are very liable to occur from the dry cork dust by spontaneous combustion and otherwise. As a class, the risk has proved to be an undesirable one. They really involve hazards of woodworkers and should be rated accordingly. The stock is very damageable.

Cotton Gins. These should be declined. There are few companies who write them. Fires are frequent, caused by foreign substances, flinty stones, matches, &c., passing through the gin, and by spontaneous combustion of cotton fibre saturated with oil from the seed, expressed during the process of ginning, or by electric sparks from the belts; or by incendiarism on the part of dissatisfied hands. There is also a moral hazard likely to creep in the older gins due to improved processes of ginning. Adjustments are generally unsatisfactory, and companies as a rule decline them.

Cotton in Transit. Railroads or Steamboats. Should not be insured without consent of the company first obtained.

Cotton and Woolen Mills. Since the inventions of Hargreaves, Crompton, Cartwright and Peel, great improvements have been made in cotton and woolen mills, but still more important has been the progress in the direction of the prevention and extinction of fire. The first-class cotton or woolen mill of to-day is a very different fire risk from that of even twenty years ago. There is still, however, a large number of mill owners who are either ignorant or indifferent as to the truth of certain well established and generally conceded facts—such, for instance, as that steam-pipes will ignite wood; that cotton or woolen waste will burn spontaneously and should not be left in the mill over night, that, consequently, extreme cleanliness should be observed; and that the picker-room being, as statistics show, the most dangerous part of the risk—especially in cotton mills—should always be outside of the mill, and so protected that, in case of its burning, it will not endanger the mill itself.

I shall endeavor, by placing before agents such statistics of fires as may not exact too much space, to help them to convince those manufacturers who still entertain doubts on these important points. Failing in this well-meant attempt, however, I think no obtainable rate should be a sufficient inducement for a company to insure the mills of such owners as may prefer to wait until the more expensive teaching of personal experience has demonstrated the truth of our statements.

It may be well at this point to call attention to the fact that fires in cotton and woolen mills result more frequently from steam-pipes, spontaneous combustion and pickers than from any other three causes.

As to the dangers of steam-pipes, see page 164 and as to the danger of spontaneous combustion see page 140.

Construction. Mills should be constructed on slow burning principles already explained, pages 124, 125, etc., especially with reference to their being easily kept clean. Hollow wooden cornices should be avoided, an ordinary bracket cornice being equally ornamental and *much safer*. Boxings of eaves in attics, etc., are objectionable, as is the ceiling of roofs, walls, or under surface of beams; in fact no concealed place should be left large enough for rats to secrete waste or oily cotton, or build nests in.

All wool spouts or chutes should be closed when not in use, that they may not conduct fire from story to story or increase the draft. Band holes should be boxed and sills of doors laid high to admit of flooding, at least one inch deep, in case of fire. The floors should be of heavy plank, with matched (tongued and grooved) flooring above this, and may be rendered almost fire-proof, if laid in mortar. A mortared floor of this kind saved the Pennacook Cotton Mill, at Fisherville, N. H., in December, 1866 —a fire burning the entire roof off without extending below.

Unless mortar of a good quality is used and well laid, it is liable to disintegrate and afford burrowing places for rats and mice between the planking.

The stairways should be outside in a fire-proof porch, or enclosed in brick shafts (walls of shaft to extend through roof), with standard fire doors on all communications to the different floors; *they should not be endangered or made impassable, by having the supply of oils kept under or near them.* Elevators should also be in the porch, or in brick shaft similar to stairs. Belt towers should be arranged in the same manner; power being transmitted by shafts through the wall into the several floors (see. page 414.) Tops of vertical shafts should be covered overhead by skylights glazed with thick glass, protected above and below by wire netting.

The loose flyings of cotton or wool should be carefully swept from the *upper surfaces of stove-pipes* or steam-pipes, and from rafters and other wood-work, especially near belts, which, at a high rate of speed sometimes generate electricity and sparks sufficiently strong to ignite wood at a distance of eight inches from the pulley or belt. A fire occurred in this manner in the day time, in the Appleton Cotton Mills, of Lowell, Mass. When first discovered a constant stream of sparks was passing between the belt and the corner of the timber which had been on fire.

I quote from the Journal of the American Institute and the report of the late Mr. James B. Francis, C. E., of Lowell, Mass.:

> "It is not infrequent to find in the belt-boxes of a mill an accumulation of dust and flyings of cotton or wool, covering everything not in rapid motion to a sensible depth. In this case the belt box was very clean, to which fact, perhaps, may be attributed the slow progress of the fire and the detection of its cause."

"Electrical excitement, manifested by sparks, shocks, and the symmetrical arrangement of the fibres of cotton and wool, is so common in our cotton and woolen mills as to excite no remark, it is, however, very different at different times. It is frequently used to light gas; a person standing on the wooden floor, and presenting one finger to a belt from which he can draw sparks, and another finger to the gas as it issues from a metal burner, the gas is instantly lighted. When the electrical excitement is strong, the same thing can be done at a considerable distance by several persons holding each others hands. It has never been observed here before, that any other substance than gas could be thus ignited. Since the fire, however, the Agent of the Appleton Company *has suceeded in igniting tinder by the sparks passing between the belt and the top of the bolt, and I have since done the same thing.*"

"Many fires have occurred in our cotton mills which could not be accounted for at the time; ample means are provided for extinguishing fire, if promptly applied, which they are likely to be when the machinery is in operation, when, of course, the workpeople are at hand. So far as I have observed, electrical phenomena are exhibited in the mills only when the machinery or shafting is in motion. By the light of the late fire at the Appleton Mills, it appears probable that many other fires which were totally inexplicable at the time of their occurence, may be attributed to this cause."

LIGHTING. If by kerosene lamps, they should not be suspended by strings or cords; wires or chains alone being safe. They should not be nearer to the ceilings or wood-work above them than thirty-six (36) inches, and should be protected by *suspended* shades, and not by metal nailed against wood-work above, which may conceal charring without preventing it. An instance is mentioned by Mr. Braidwood, Superintendent of the London Fire Brigade, where a gas-light set fire to a ceiling twenty-eight and one-half inches from it.

If lights are protected by coverings, whether of wire or glass, care should be observed in keeping them clear of the dust, flyings of cotton, etc. *Unless this is seen to, shades are objectionable, as they serve only to collect inflammable material in dangerous proximity to the flame.*

Many fires are caused by swinging brackets, unprovided with stops to prevent their being *swung under or near wood-work.* If kerosene is used, only a safe article, *not less* than 110° flash test should be permitted. If gas is manufactured from benzine, benzole, naphtha, gasolene, or any product of petroleum, the reservoir should be under ground, at least thirty (30) feet from the mill, and the air-pump or blower, if in the building, should be provided with an automatic valve to prevent *the passage of*

gas to the air-pump from the reservoir. The air should be taken into the air-pump or blower through a pipe connecting with the outside of the building, *so that any back pressure will send the vapor into the open air instead of into the building.* The installation should be in accordance with the rules and requirements of the National Board of Fire Underwriters. (See page 160.)

No fire-heat should be applied to the gasolene in order to make it vaporize, for the reason that gas-pipes are quite certain to be, at some point, so placed as to be subject to severe cold, and the result will almost inevitably be condensation, which is extremely dangerous.

No material for making gas must be stored where, in case of fire, it would endanger the building or insured property.

The gas-metre should not be exposed to fire in those parts of the mill most liable to it, such as the picker-room, dry-room, or in the boiler-room, where a leakage might ignite at the furnace. (See page 414.)

The Social Mill, of Woonsocket, R. I., a mill of 50,000 spindles, was entirely destroyed by a fire which might have been easily extinguished but for the fact that at its very commencement, it attacked a large metre, melted a lead pipe and, filling every room with gas, defied all attempts to save the building.

WATCHMAN. Only a reliable and sober man should be employed, *thoroughly conversant with all the fire appliances of the mill.* The keys or pulls of his watch or clock should be located at the extremity of each room farthest from the entrance, necessitating his traversing the entire length of the room to make his record. Only sperm or lard oil should be used in his lantern, *which should be a covered one.* It should be locked and the key to open it kept in boiler-room to prevent opening the lantern in the mill. (See page 421.) A register should be kept of his performance of duty, and the superintendent or owner himself should take charge of his watch or clock.

DRYING. This cannot be too carefully managed. (See page 409.) Ventilation should be provided to prevent the accumulation of the highly inflammable gases generated in drying wool at high temperatures. *The watchman should not enter the room with a light, and should be instructed as to the danger of doing so.*

In December, 1866, a fire occurred at the Burlington Woolen Mills, by the ignition of gas in the drying room from the watchman's lantern, and another at the Washington, Mills, in Lawrence, Mass., October 27th, 1868, from the same cause. In both cases the drying-rooms were "illuminated as by flashes of lightning," which would seem to indicate the presence of some highly in flammable gas.

Some idea may be formed of the quantity and combustible character of the gases generated in the different processes of woolen manufacture, from the fact that it is stated the gas contained in the suint or fatty materials of the soap-suds used in washing raw wool and spun yarns in a mill of 20,000 spindles will be more than sufficient to light the mill throughout the year, allowing five hundred (500) burners for daily use. (Wagner's Chemical Technology.)

Patent steam dryers are uninsurable, especially where the heat is applied by pipes *below the wool* and blown by fans. Cold air dryers are safest.

OILS. Much depends for safety on the quality and character of the oil used, not only for lubricating purposes, but on the wool, and only those that have established reputations for purity and safety should be employed.

PICKERS AND PICKER-ROOMS. Statistics show that no more fruitful sources of fires in cotton or woolen mills exist than the pickers. They should never be in the mill, or expose it, but in all cases in a separate building, to leeward of the main structure, (according to the prevailing wind) and built of brick or stone, and with a metal roof—which will confine a fire longer than any other. If the picker-building has openings doors or windows on sides next the mill—they should be protected by standard doors and shutters, and the windows, if any, of the mill building, on those sides exposed by the picker-room, similarly protected—blank walls to both buildings are decidedly preferable In this connection it may be well to state that it is now generally conceded that a wooden door or shutter, well lined with metal *on both sides*, or an iron door, *lined with wood on both sides*, is preferable to one entirely of iron. Neither of the former will warp, and the wood, slowly reduced to charcoal, keeps the metal in shape, while the iron door or shutter, never having the heat applied uniformly over its surface, will be apt to twist or warp, and let the flame through.* A wooden door, lined with metal

*A sliding door, so arranged that it will *roll up an incline* when opened, closing itself by the force of gravity, is better than all others (See pp. 361–392.)

on both sides, at a fire which destroyed the Hartford Company's Works, at Tarriffville, Ct., saved a building abutting against one destroyed, while all the iron doors and shutters to other buildings proved unreliable. Where the door protects a communication between two buildings, the *frame-work and sill should also be of iron or covered with metal.* Picker-rooms should not communicate with mill, but if they do, the door *should not swing into the picker-room*, necessitating entrance into this room to close it, and where it is more likely to be blocked open with stock, but should be so hung as to be pushed against a fire and protect the person closing it. In addition to a fusible link, which on melting would enable the door to close automatically, it would be advisable to have some simple mechanical contrivance of a chain and pulleys, by means of which the door could be closed and secured from a distance, in case the suddenness or severity of a fire should prevent a near approach. Lights (if used at all) should be covered, and so arranged as to be lighted only from the outside. Boys and other low-priced hands should not be employed at the pickers, but only the most experienced and careful men; and strict rules should be enforced as to smoking and the carrying of matches in pockets—some of the most careful manufacturers making it a practice to search the employees of the picker-room periodically, without previous notice, in order to secure a compliance with this necessary regulation. Oil should never be applied to wool at the pickers, as it increases the danger of fire.

Those picker-rooms, where the stock is wound up in a lap at each process, avoiding the accumulation of large quantities of loose cotton, as in gauze-rooms or bins, are safest. Pickers should not be allowed to run on loose pulleys, which are liable to cause fires by friction; and should be daily overhauled to see that all wool or cotton is taken off the arms and shaft of the picker, where it comes in contact with the sides or any stationary part of the frame. The room should have no woodwork exposed. Steam jets are very efficient for extinguishing fires in picker and gauze rooms, and a small jet connected with the dust boxes of pickers is a judicious precaution. To be effective, they should have valves outside the building, and there should be no intermediate valve in the boiler-room (as is too often the case, to save loss of steam by condensation), especially if the boiler-room is

locked at night. Few more effective fire appliances exist than Automatic Sprinklers with a sufficient supply and head of water.

Casks of water and pails should be liberally provided—they require little presence of mind or skill, and can be instantly applied at the commencement of a fire and while it is still within control. They cost little, and their cheapness should insure a plentiful supply. (See page 420.)

That we are not unnecessarily strict in requirements and recommendations as to pickers, the statistics of fires in mills will show. The figures are startling when compared with the statistics of fires in other classes of risks, in view of the large number originating in the picker-rooms out of the whole number from all causes. It must be remembered, too, that many small fires in picker-rooms are never reported to the Companies by mill-owners, through a fear of causing apprehensions in the minds of underwriters, which might lead to an increase in the rate of premium—a very small advance in which, where a large line of insurance is carried, would amount to a sum possibly greater than any small loss. I know of one fire occurring in a picker-room, resulting in a loss of over one thousand dollars, which was never reported for this reason, the owner not wishing to draw attention to any want of safety in his large mills, of which he owned several.

In view of the large number of fires originating in picker-rooms during the past ten years, I feel justified in pronouncing any mill with the picker in the main structure—and not in a fire-proof room—as *uninsurable*, and those mills where the pickers are in separate buildings, not endangering the mill, as the most desirable risks.

Fire appliances and apparatus. (See pp. 420 – 422.) I have already mentioned steam jets, sprinklers, casks of water and pails, in connection with picker-room fires. This water should be salted, or chloride of calcium may be added, to prevent it from freezing. Pails full of water should be plentifully distributed throughout the card, drying and spinning rooms.

Too much cannot be said in favor of these simple provisions. What threatened to be a dangerous fire, in a New England mill, was extinguished by the use of pails of water and *wet brooms*. Sprinkler pipes should be of *wrought* iron, gradually decreasing in size as they extend from the rising main, which, to supply them

fully, should be at least double the area of the total areas or orifices of distribution, even when supplied by a reservoir 100 feet higher than the mill. With a less head of water, as, for instance, where the reservoir is not higher than the mill itself, the proportion should be greater, say four or six to one. Vertical stand-pipes from basement to attic, connected with a tank of water in the attic and with the force pump, should be provided. *They should be located near the stairways to enable their being used for a longer time, and the hose should always be attached to hydrants at each floor.* It is needless to suggest the difficulty and delay of adjusting the threads of couplings in the excitement attending a fire.

The force-pump should not be located where it is liable to have its belt (if run by belt, which is objectionable) cut by a fire, and if run by gears, *should be thrown into gear at night.* The belt should not be left off the pulleys or hung up near by, as is sometimes the case, rendering it liable to shrink beyond the possibility of springing it on in case of fire. It should be tried at least once a week, to see that it is in order, and especially in winter, to empty the cocks and see that pipes are free.

Force-pumps, no matter how large or powerful, are effective only in proportion as they are supplied with power. If by steam, the steam areas should be to the water areas as four to one;* a less proportion is not sufficient. It need not be suggested that sufficient steam should be kept up during the night and on holidays to operate the pump in case of fire.

If outside hydrants are provided, connected with a reservoir, they should be protected from the frost, and have not less than 100 feet of good hose attached, and be protected from the weather by suitable housings. The couplings of all hose of the mill should fit that of the nearest city or village fire department, or reducing couplings be provided to remedy the fault.

Roof hydrants are admirable and should be provided.

Fire extinguishers, especially those whose mechanism requires merely that they should be reversed to be ready for use, are very efficient, and if kept in every room will materially increase the chances of extinguishing a fire.

Organization. Each man should have his appointed task in case of a fire, and understand it beforehand. The greatest

*With steam at high pressure.

safety lies in a just apprehension of danger, and the extinction of a fire depends largely, if not entirely, upon the intelligence and concert of its management. In the best managed mills the male employees are regularly drilled to prepare them for any fire that may occur, that there may be no confusion or panic, and the proper action taken at the very beginning of a fire, when alone it can be got under control, if at all.

Cotton Platforms, Railroad. To the inexperienced, bales of cotton on an open platform near a railroad would suggest the minimum of hazard from an underwriting viewpoint. But railroad platform cotton has been a losing risk to companies. The writer's early education as to lines and rates was emphasized by a fire at Charlotte, N. C., in 1875, when a policy of $10,000 covering cotton on a platform, which took fire at midday, when it might reasonably be supposed that the laborers could have rolled the cotton out of danger, proved a total loss. The cotton is especially liable to be ignited, not only by the sparks from locomotives, but by sparks from pipes, or by loose matches, or by spontaneous combustion; and small lines at full rates, and the approval of the company, should be the rule.

Cotton Pickeries. Decline.

Cotton Presses. These should be carefully inspected with reference to arrangement of boilers; to the care and disposition of the loose or waste cotton; to the rules as to employees; to the storage of cotton in adjacent streets, and to the general carelessness which too frequently prevails. Boiler should be outside.

Cotton Seed Oil Mills. These involve all the hazards of cotton in the lint room, and of cotton ginning to some extent. The modern mills have been very much improved over those first constructed. Fire appliances, especially pails of water in the lint room, are important. A steam jet opening into the lint room would be a desirable appliance.

Country Stores. These are undesirable, unless occupied in part as a dwelling by the family of the owner, and unless located in some good town or village. Where they are at cross-roads their trade is precarious and their future uncertain. Isolated stores not occupied in part as dwellings should be declined. They have been losing risks to insurance companies, due probably to the fact that they can be so easily robbed at night, by the wagon-load, and afterwards burned to conceal evidence of the crime.

Court Houses. These are supposed to be good risks by many underwriters, but they have not proved profitable. Where any rivalry exists between two towns in the same county as to the location of the county buildings, it is not safe to insure them. The inhabitants of a rival town naturally desire to secure the trade which the holding of court brings to the county seat, and vicious persons sometimes remove what they consider the principal impediment in the way of a "change of venue" by destroying the county buildings. Numerous court-houses have been burned in the South and West to cover evidence of extensive frauds in land titles, which were some years ago practiced in some sections of the country and resulted in a serious moral hazard to some of the risks of this class. There have also been fires caused by criminal classes desiring to burn the evidence of crime, indictments, affidavits, &c., &c., in the court-house or in the hands of officials, district attorneys and others. The buildings are often left uncared for after hours, and cigar stumps and cigarettes thrown away in sawdust spittoons or waste paper baskets are responsible for many fires not otherwise to be explained. Full rates should be obtained and buildings carefully inspected with regard to heating apparatus and the care taken of them. Jails connected with court-houses do not improve them as risks; they should add about 25 cents to the rate. If halls are rented for exhibitions, the rate for halls should also be added. The county records should not be insured.

Cracker Bakeries. Where these are constructed properly they may be taken at full rates. Special attention should be paid to the ovens. Unless these are so constructed that fire cannot possibly ignite any woodwork above them (neither the oven nor its mouth should ever be under wooden beams or wooden structures) the risks should be declined. The accumulation of empty boxes and barrels in proximity to the ovens, with the intention of using them for fuel, is also objectionable, and if shavings are used for fuel (and they frequently are, where a planing-mill is in the neighborhood and they can be purchased cheaply) one per cent should be added to the the rate. Specific amounts of insurance should be written on the stock, on the machinery, tools and fixtures, and on the building.

Creameries. These have not proved profitable risks. They have about the same hazard as cheese factories and need the

same inspection and care. Examine as to boiler hazard, co operative feature, &c. Worth 3% to 3½% for best.

Crematories for Garbage. These are usually nuisances and, at obtainable rates, are unprofitable. Every person owning real estate in the vicinity is apt to have an exaggerated idea both of the future value of his property and the injury to it wrought by the crematory. Even though the wagons for hauling garbage simply pass in front of his premises on the road to the crematory, the average owner realizes that the locality will be unpopular. The grinding, drying, grease hazard, &c., are serious physical hazards.

Crematories for cremating human bodies ought to be incombustible throughout. They are sometimes regarded as nuisances. One was burned recently near Atlanta, Ga., after numerous newspaper protests and efforts on the part of citizens to secure injunctions.

Creosote Works, Wood Preserving, &c. These are special hazards which should not be insured without the consent of the company first obtained, upon full survey and information as to the particular process, the arrangement for heating creosote, storage of wood, and dry-room, if any.

Crucible Manufactories. Refer to company with full report before binding. The kiln hazard is serious.

Currier Shops. These have been unprofitable at obtainable rates. They are frequently dirty, liable to spontaneous combustion, of cheap construction, and need to be most carefully inspected. Oil and grease hazard is serious.

Cutlery Manufactories. These risks ought not to be objectionable if the buildings are well constructed and the management is a careful one. The stock is particularly susceptible to damage by water and heat, and a much higher rate should be secured upon it than on the building and other contents.

Cycloramas, Panoramas, &c. These are frequently of fancy value. A hole burned in a large painting might result in a claim for a large loss. As they are moved about from place to place, they are seldom installed in any one locality with proper care as to danger from fire, and the electric-light wiring is usually unsafely arranged. They should not be insured except for small amounts,

and only then with the approval of the company first obtained. The buildings are undesirable because of a temporary character and unsuitable for anything else.

Depots. Refer to company.

Distilleries, Whiskey, High Wines, Etc. These should be submitted to the company in all cases before binding. The grinding hazards should be inspected with all the intelligence and carefulness which is necessary in the case of flour-mills. The cooper-shop should, also, have the attention due to its class. The hazard of distillation ought not to be serious if the distillery is carefully constructed and managed.

Drain and Sewer Pipe Manufactories. The hazard of these risks lies chiefly, of course, in the furnaces and kilns, and special attention should be given to them, the company being advised fully as to construction, care, &c., &c. Many of the buildings are of cheap construction—and cheapness in construction is usually an incident of those classes of risks which show the highest loss ratio. Steam drying and boiler hazards need careful inspection.

Driving Park Buildings. Decline.

Dredges. Refer to company before binding.

Drug Mills and Wholesale Drug Stores and Stocks. These are unprofitable at ordinary rates. The stocks are peculiarly liable to severe damage. Poisons are liable, through the medium of saturated water, to render the balance of the stock unsalable. It is almost certain to be condemned by boards of health. Moreover, fires once started are very rapid; aided by elevators, lift-ways, dumb waiters and the extremely combustible nature of the stock, they are seldom extinguished until the property is destroyed. Wholesale drug stores and drug mills are bad exposures to neighboring buildings, and intervening walls should be of unusual thickness and carried high above the roof to afford proper protection. Sawdust sprinkled on floors is an incident of these risks, and the presence of oils, especially of siccative or drying oils, like linseed, cotton-seed, rape-seed, &c., makes the sweepings particularly dangerous. It is safe to decline to insure a drug risk where sawdust is used for sprinkling the floors, and where sweepings are not removed from the floor so soon as collected; and receptacles for sweepings should be of metal and

kept on the sidewalk, where their ignition cannot cause a fire. The proprietor of one wholesale drug store told the writer, who remarked favorably upon the storage of the sweepings on the sidewalk, that such sweepings had taken fire more than five times, and that he (the owner) believed if they had been left in the building the store would have been burned to the ground. The drying and drug-grinding hazards are serious and should be carefully reported on.

Special attention should be given to the oil room. Only sand should be used on floor. This is frequently in the cellar, where the darkness requires the use of artificial light—an objection.

Special attention should also be given to the packing room, to see that the material for packing is kept in bins or boxes, and that the floor is not so littered with material as to cause the rapid spread of a fire. Refer to company before binding with full report as to oils, explosives, ethers, acids, &c., stored.

Drug Stores. Retail and Perscription. These are good risks at fair rates. Most of the stock is kept in bottles. They are neat and clean as a rule, and the druggist is on hand at all hours of the day and night. The packing and unpacking room is often carelessly managed, and this should be looked into. Sometimes there is a hazard due to incompetent help.

Dry Houses. (See page 409.)

Dry Plates, Photographer's, decline.

Dry-Rooms. (See page 409.)

Dwellings. A well built dwelling, with safe flues and careful, honest tenant, is the best risk, *at an adequate rate*, which the agent can secure. At the extremely low rates current in some localities, however, dwellings may be more undesirable than some special hazards. The construction of a dwelling, divided up into various compartments or rooms, not offering, in case of fire, facilities for drafts and currents of air from cellar to roof, so common to warehouse and other risks, not only prevents the rapid spread of a fire, but favors its extinction. The fact, also, that the building is occupied day and night insures the detection of fire and its extinction, and insures also an elimination of a large proportion of the external incendiary hazard. It may safely be assumed that the majority of those who would be vicious enough to set fire to a building would be deterred from

doing so by the mere fact that its burning would endanger life; and, of that minority who would be indifferent to such consideration, it may safely be assumed that a majority would be deterred from firing a dwelling because of the severe penalty attached to the crime of incendiarism, where life is endangered, by the laws of most of the States.

It is not unusual for inexperienced persons to recommend a mercantile or other risk to the company as being "just as safe as a dwelling," urging the absence of fires, lights and other features of the risk as reasons why it should be insured even at a lower rate. Such arguments result from inexperience. No risk not constantly occupied can be as safe as one that is so occupied. An old friend of the writer once remarked that a mother's nose was the most reliable automatic fire alarm that he knew of. It is safe to assume that ninety per cent of the fires starting in dwelling houses are detected and extinguished without ever being reported to insurance companies.

In inspecting dwellings the points to be examined for are, first, the *flues*. These are often very insecurely built from an upper floor, resting on posts or joists, and of a single brick in thickness. As buildings settle, cracks open and sparks escape into an unused attic, where all the woodwork and, possibly, a shingle roof are as dry as tinder. Buildings do not settle equally and chimneys crack, at places out of sight, frequently where they pass through the roof. Defective flues figure largely in our causes of fires—so largely, in fact, as to call for the greatest care on the part of agents and inspectors, who should examine the chimneys of buildings from the foundation to the roof. Any one of the larger insurance companies probably loses a thousand dollars a day (certainly twenty per cent. of its losses) from defective flues, and would make a fair profit if this one item could be corrected. Taking into account the annual loss of life from this cause, does the fact not warrant stringent building laws from the community viewpoint? *Open pipe-holes* cause many fires by escaping sparks. They should be provided with close-fitting metal stoppers, when not in use. *Hearths* should not rest upon wooden beams (see page 89.) *Furnaces* should be constructed as recommended on page 96. *Ashes* should not be kept in wooden vessels in the building, or in barrels or wooden boxes in contact with the frame wall outside. *Wooden fire-*

boards are dangerous in case of falling, burning soot. Kindling wood should not be left in or near stoves to dry for the morning fire. Housekeepers should be cautioned against this very common and dangerous practice, and also as to the use of *kerosene* for kindling fires. The supply of kerosene—especially if any quantity is kept in a can or barrel—should not be in the same room with a fire, as, in case of a leak, the most serious consequences might result. Oil kept in a warm room, as explained on page 157, will evaporate a dangerous vapor, which will ignite at the fire or upon the approach of a light. Housekeepers should be cautioned, not only as to the filling and trimming of kerosene lamps near a light, but *near a fire*, also, which is equally dangerous. Inquire as to the care of *matches*, and instruct housekeeper as to their danger if left within the reach of children or of rats and mice. If the building is lighted by gas, the burners, especially in the case of movable brackets near curtains or woodwork, should be provided with glass shades.

Stove-pipes should never pass out through side walls, windows, or through roofs; and where so arranged, as in summer kitchens, the agent should examine carefully to see if they are safely protected by metal or in some other effectual way—they can seldom be made safe. Advise the company fully on this point.

In case painting is being done, or where the furniture or woodwork is oiled, especially in the case of dwellings finished with hardwood trimmings, the agent should caution the housekeeper as to the danger of rags saturated with linseed oil—they must not be left in the building after use.

We have been thus explicit on many points, already elsewhere treated of, on account of the custom, on the part of agents, of neglecting the inspection of dwellings. *All risks need inspection*, and the visit of an intelligent underwriter, even though he may discover no fault in a risk, is valuable, as it may call the attention of owners to the danger of fire, and lead to precautions which will secure immunity from it. (See "Causes of Fires," page 131.)

Dwellings Unoccupied are poor risks and should be avoided, unless surrounded by good, occupied dwellings, and in charge of some careful person. Chronic cases of vacancy, especially in

isolated or *unhealthy* locations, are bad risks and should be regarded as *uninsurable.*

Large dwellings, including so called "palatial residences," are unprofitable at current rates. (See page 60.) The dining room of a large New York dwelling cost $80,000. It is needless to say that a fire in this one room would be expensive. The rate should approximate an increase over ordinary dwelling rates by 1% for each 1% excess of value over the average. Thus a dwelling 50% more valuable than the average of its neighborhood ought to pay 50% more rate; one of double the average value should pay double rate.

Season.—Summer or Winter dwellings. The rate for this class should be 50% more than for ordinary country dwellings, and should be still higher where they are exceptionally large and expensive.

Dye and Print Works. (See Bleacheries.)

Dynamos. Refer to company before binding.

Electric Car Stables or Barns. These require examination by experts, and the local board inspector should be consulted. The various hazards of electric wiring would require more space for discussion than can be spared for the purpose. Even if it were possible for an agent to educate himself for the task by studying a printed treatise on the subject of electricity, it would be better for him to rely upon the inspection of an electric-light plant by a specialist, such as is to be found in the local board of most of the important towns of the country. (See National Board Rules.) (See Page 438 as to insurance of cars.)

Electric Light and Power Stations. Refer to company before binding.

Electrotypers. These are generally on upper floors of buildings, and this fact should be taken into account in making the rate; it is generally overlooked. Examine and report fully as to casting floors (these are too often protected only by loose bricks on wooden floors below), metal melting furnaces, method of heating wax pots, wax irons and soldering irons, and the use of benzine. Electrotype plates are undesirable insurance as a rule.

Elevators, Grain. Decline insurance on *buildings.* Accept lines on grain contained in them, at short rates.

Where grain risks are desired *by the year*, the same rate should be charged as on the building. Decline to insure, by the

year, in the name of the warehouseman on grain stored in his elevator. Under no circumstances should he be permitted to obtain annual policies, at the current rates, in order to peddle them out to his customers for short terms and at short rates. Insurance is our business, not his. He would thus be enabled to profit at the expense of those underwriters foolish enough to consent to such an arrangement. *The rates are not graded for annual policies* and are entirely too low, unless we obtain short rates. We prefer risks on the *grain* in elevators to risks upon the *buildings* themselves, even at the advance in the rate of fifty cents, usually called for by the tariff. Grain follows the trade and market and is always to be found in paying localities, but the elevator building remains through all the hazard of a change of trade, and partakes, eventually, of the moral hazard of an unpopular market or undesirable locality. Grain elevators located on the line of railways may thus become liable to a serious moral hazard, in consequence of the building of a new railroad and a change of trade. Examine carefully all bearings, especially those in the upper portion of the building, and report arrangement of separators, oat clippers, screens, etc., and general condition as regards cleanliness, always keeping in mind that the dust hazard is a serious feature of the class. Boiler rooms should be cut off. The use of carbon bisulphide for eradicating weevils and other insects of late has added another and serious hazard to the class. It is an extremely volatile liquid and the fumes are ignitible and explosive. making it dangerous to use lights until the odor has entirely evaporated. Either steam-jets or sprinklers are desirable fire appliances, especially for higher bearings in head house. If broom corn stored, decline.

Elevator Car Manufactories. These have the hazards of wood and metal workers and should be inspected the same as railroad car manufactories.

Enameled Cloth Manufactories. Same as Oil cloth manufactories.

Engine (Steam) Manufactories. (See Machine Shops.)

Engine (Fire) Houses. Would seem to be good risks but they burn often when men are away at fires.

Envelope Manufactories. There are so few of this class that probably ninety-nine agents out of a hundred would have no occasion to consider them. They could be made good risks if

managed with care and cleanliness. Paper clippings should be properly stored and handled. Some of the larger risks of the class carry the hazard of printing and paper box factories in addition.

Excelsior Manufactories. Declined by most companies, and those who write them charge a very high rate. The principal hazard is in the manufactured material, which is subject to quick flash fires, like shavings. Confer with company before binding.

Fair Ground Buildings. Declined by most companies, and high rates are charged by those who accept the class. Confer with company before binding. This class of property is neglected throughout the greater portion of the year and is sometimes burned by incendiaries, who desire to have the fair buildings transferred to another town. At the time of holding fairs the most dangerous processes connected with gasolene, calcium carbide, dangerous chemicals, etc., are on exhibition, and the physical hazard at such periods is considerable, not overlooking the great danger from cast-away cigarettes and cigars while still ignited among refuse paper and in out of the way places to cause a fire. The grand stands are particularly undesirable. (See Grand Stands.)

Farm Risks. We lose money on this class at current rates, and must insist not only on a personal inspection, but full information regarding every risk. Must have in every case a liberal amount of personal property insurance, including live-stock; decline barns, small dwellings and other buildings at a distance from the main group of buildings, also traveling threshing machines and all property where they are stored. Write company for full instructions and policy forms.

Felt Mills. (See Cotton and Woolen Mills.)

Fertilizer Manufactories. These are usually "nuisances" and should be referred to the company. Where rendering is done, using waste animal matter and dead animals, the grease and bone grinding hazard predominates, and they are practically uninsurable at obtainable rates. Phosphate mills are better risks of the class, but require great care and intelligent examination to prevent loss. Especially where sulphuric acid is manufactured, saltpeter used, &c., care should be taken in the storage of sul-

phur, coal, &c. Empty saltpeter or nitre bags are especially dangerous, being liable to take fire spontaneously. The saltpeter, therefore, should be stored where its burning would not endanger the risk, and under no circumstances should empty bags be allowed about the premises. Great care is necessary in the construction of the Guy-Lussac tower. (See Acid Works.)

Under no circumstances should risks be taken on the manufactured product, unless with an 80% co-insurance clause. Otherwise, it will be short insured, and only for the amount necessary to cover the burned surface, which would result in a total loss under the policy. The entire surface of a quantity of fertilizer might be burned off without injuring the unconsumed portion. Without the 80% clause, not less than double rates should be charged.

File Manufactories. (See Hardware Manufactories.)

Fire-Arms Manufactories. These have the usual hazards, those of machine-shops, foundries, &c., and should be inspected with regard to such features, also woodworking of gun-stocks, if any. Where fixed ammunition is loaded, the rules with regard to cartridge manufactories should be observed and a separation from other values insisted upon.

Fire Engine Houses. (See Engine Houses.)

Fireworks Manufactories. Decline.

Fireworks Stocks. fire-crackers and torpedoes only. Increase rate on the building and stocks with which they are kept 15 cents per $100 per month being short rates of 75 cents per annum.

Fixtures and Furniture of Stores. This is desirable insurance. (See form for insuring.)

Flags and Banners. Stocks of, decline.

Flax Mills. These have not been profitable risks at obtainable rates. Carelessness as to open lights, and collections of combustible fibre or flyings in closed lights or on tops of stovepipes and on steampipes, spontaneous combustion, &c., have caused many fires. They should not be insured without the consent of the company obtained after full survey and report.

Flour Mills. These should be referred to the company, after thorough inspection and full report. The class has not been a

profitable one. Decline mills equipped with old style machinery or located where a full supply of grain cannot be obtained at prices which will enable them to compete with larger mills at great grain centres.

The fine dust of flour mills is very inflammable, especially that from the "middlings," which has been known to take fire readily—like gas—from the flame of a candle. For this reason, no open lights should be used. Notice whether the floors are kept cleanly swept, and free from accumulations of rubbish in corners. Many millers, in case of a "choke" in the chutes or elevators, shovel the bran or other material out upon the floor and neglect to remove it. The *overflow of oil on flooring, underneath bearings, should be cleaned up daily.* Metal *drip cups* should be provided to catch the falling oil. The smut machine should not be above the lower floor, where it can be easily watched, and flooded with water, in case of fire, and where the smell of fire or of a heated journal will be soonest detected. Unless the smut is blown out of the building by the machine, it should be removed daily, and not left in the mill over night, as fires often occur from spontaneous combustion where it is allowed to accumulate. Wooden journals are dangerous, if the number of revolutions is over 100 per minute. There is no excuse for them anyway. Decline water power mills where the supply of water is not sufficient to keep the mill in *constant operation* (unless steam power as an auxiliary is provided.) In water power mills, the fore-bay should be planked above the highest rise of water, and the *water-wheel securely blocked*, when the mill is stopped at night or on holidays, *to prevent freshets from running the mill while unattended and causing fire from friction.* Some advocate letting the runner burrs down to hold the lighter running machinery. The more secure way is to block the wheel. We prefer grist mills doing custom work only, to those flouring grain *for the general market*—the latter are speculative and liable to losses from fluctuation in prices. Scrutinize values closely. Owing to the large number of chutes, spouts and elevators in flour mills, they usually prove a total loss, in case a fire starts, and this fact should not be lost sight of in making a rate.

The numerous fires caused by the ignition and explosion of the middlings and other fine dust of flour mills, in consequence of

carelessness in the use of open lights, call for more than usual care in the inspection of risks, and for warranties in the policy that open lights shall not be permitted. It is not, however, by open lights alone, that such fires may be caused. The same result may be produced by electricity from belts or by the friction of the stones, as where the feed goes off while at work. Being of a flinty, hard rock, they strike fire easily. The "feed" may go off for the want of grain in the hopper or in consequence of an obstruction in the feed-pipe. A spider's web was sufficient to stop it, in one case, and led to a violent explosion in an English mill.

When flour is showered from a sieve, over a gas flame, rapid combustion takes place. The same result follows the contact of flame with many other kinds of combustible dust. In the Pullman palace car works in Detroit, an explosion occurred in one of the chutes for conveying rubbish, shavings, etc., caused by the ignition of the wood-dust, which had—probably for the first time in years—assumed the precise proportions of admixture with the air necessary to cause explosion.

The following are some of the many instances of fires in mills, caused in the manner described.

Mill of Champion, Adams & Co., Detroit. This mill was running at night, with the proper number of men. The man in charge of that portion of the mill where the fire occurred went into the bin where the middlings were stored, with a lighted globe lamp, for the purpose of shoveling middlings. He placed his lamp on the floor and proceeded with his work, raising clouds of dust which filled the whole of that portion of the mill. *The glass globe of the lamp had been broken* some time before, and permitted access of the flour dust to the flame. The result was a fire so rapid that the man was severely burned in his unsuccessful attempts to extinguish it.

A fire destroyed the mill of Mr. Bertchy, at Milwaukee, and was caused by a candle left burning near a feed spout.

The burning of the Tradeston Mills, at Glasgow, Scotland, was caused by the ignition of flour-dust by the friction of the stones—the feed having accidently stopped. The stoppage of the feed is less likely to be noticed in a mill of many runs of stone, than in a small mill of only two or three. The Tradeston

mills were among the largest in Scotland, and the explosion, in the instance mentioned, burst the dust-box. "There were other parts of the mill, where processes were going on, which produced large quantities of combustible dust, and this was the cause of the second and larger explosion, which blew out the gable ends, reduced the mill to ruins, and set the woodwork on fire."—*Glasgow Herald.*

I quote from the report of Professors MacAdam and Rankine as to the above fire as follows. The report states:

"That the fire inflamed the finely divided dust which was diffused through the air in the exhaust conduits, and then passed on to the exhaust box."

"That the sudden combustion of the dust diffused through the air would produce a very high temperature in the gaseous products of the combustion; and this would necessarily be accompanied by a great and sudden increase of pressure and bulk—constituting, in fact, an explosion."

"We have ascertained, both from the evidence of eye-witnesses, and from printed and published documents, that fire explosions similar in their cause and nature to that at the Tradeston mills, are accidents of ordinary occurrence in flour mills, especially since the introduction of the apparatus called the 'exhaust.' This fact, however, is little known to the general public, or indeed, to any one except those practically employed in working such mills, though it appears to be better known on the continent than in Great Britain, being mentioned in French and German treatises upon flour mills, but not, to our knowledge, in the standard English books on that subject."

"Indeed, the readiness with which flame can be transmitted through an atmosphere of flour-dust and air, may be experimentally shown by showering some of the fine dust through a sieve placed a few feet above a gas jet or other flame. The combustion of the dusty atmosphere takes place with explosive rapidity; and, in some respects, resembles the flame traveling along a train of gun-powder or flashing through a mixture of coal-gas and air."

"The flour dust mainly consists of starch and gluten, accompanied by smaller proportions of gum, sugar and oil. All these substances are composed in greater part of carbon, hydrogen and oxygen, and when burned they yield carbonic acid and carbonic oxide gases and water vapor. These gases necessarily tend to occupy a greater space than the dust and air which give rise to them, and this extra space demanded by the products of the combustion is much enlarged by the high temperature produced during the burning, and which tends greatly to expand the volume of the gases.'

"*We have determined, by direct experiment, that flour-dust diffused through the air contained in a box, and set fire to, explodes with violence, splits up the wood, bursts the sides, and lifts up the box even when ladened with heavy weights.* Indeed the mixture of flour-dust and air is destructively explosive, and there can be no doubt that the fire-explosion of the dusty atmosphere in the exhaust box in the Tradeston mills, which was eighteen feet long, nine feet high, and seven feet wide, would shatter the sides and force the accumulated fine dust lying on the shelves and floor out of the box into the atmosphere of the mill."

The Mascoutah mills in Illinois, were burned. The miller approached the middlings chest for the purpose of jarring the middlings down, and the cloud of dust following the attempt ignited at a small open lamp.

Schmidt & Co's mill at St. Louis was destroyed in the same manner.

At Evansville, Ind., a fire occurred in the flour mill of Iglehart Bros., caused by the ignition of flour-dust at the middlings chest.

At Dover, Kentucky, a breakage in one of the floors of the mill resulted in a shower of dust *which ignited at the boiler furnaces.*

In this connection it may be well to state that the boiler and furnaces of a flour mill should always be outside of the mill and *at the end farthest removed from the flour elevator*, as the draft of the furnaces would, naturally, have a tendency to draw in the flour-dust floating through the air.

A fire and explosion occurred in the Atlantic Mills of Brooklyn, caused by the ignition of flour-dust by an open light. The rope to the return side in the bolting chest broke, and the miller, going with an open light to repair the damage, caused an explosion and fire, and was severely burned while trying to escape. Fortunately a vertical stand-pipe, with hose attached, enabled the employees to extinguish the fire.

I might add to the above list, but I think that it is sufficiently long to convince agents and millers of the great danger of open lights in a mill, near middlings-chests, feed-spouts, bolts, exhaust-boxes, or the stones themselves—in fact, anywhere outside of the office.

A Davies safety lamp should be used with the glass globe, as the latter is liable to be broken by an accident, at a most inopportune moment.

It has, at last, become apparent that companies must insist upon warranties in their policies as to the use of open lights.

The learned scientist, Dr. MacAdam, in an interesting paper read by him before the Royal Scottish Society of Arts, argued that flour mills, under some circumstances of carelessness, are almost as dangerous as gunpowder mills. He claimed that in

order to produce explosion, as well as fire, it is only necessary that the flour mixture be more or less confined within a given space, and that the fine, impalpable dust be diffused through the air in certain proportions. He advocates the separation of the different processes of flour mills, so that the entire property need not be destroyed by a single accident.

In entertaining applications for the insurance of flour mills, therefore, we desire our agents to notice whether both the owner and men employed recognize this danger from open lights. The stubborn skepticism of those claiming to be "practical" men, as to what they are pleased to term "theory," frequently causes losses. I have been thus explicit on this important point and have devoted this much space to the statistics of fires, in the hope that it will enable agents to convince the most skeptical as to the danger from open lights, and, also, as to the danger of permitting smoking in a mill, outside of the office. No reasonable man would decline to learn from the misfortunes of his fellows, and if any mill-owner persists in entertaining doubts on this important subject, it is best to let him insure himself.

I think President Washburn of the Home was one of the first, if not the first, to call attention to the explosiveness of flour dust in mills.

Avoid *over-taxed mills*, i. e., mills which are run beyond their average capacity. They are apt to break down or to burn from friction.

Grain is sometimes stored so that it covers slow-running journals. This is dangerous. Examine carefully all *journals on upper floors* and in dark, out of the way places. They should be regularly oiled, and any greasy rags or cotton waste used about them should not be thrown carelessly aside, as is too often the case, thus endangering the mill. Metal receptacles for oily waste should be provided, and regularly emptied every night.

The over-loading of floors, either with flour or grain, is liable to cause sagging and throw shafting "out of line," resulting in friction and heated journals.

The moral hazard of large flour mills doing a "merchant" business—i. e., grinding to sell on owner's account—is often very serious, owing to the fluctuations of the market. A loss

of a small amount in the market price of a barrel of flour may entail a loss of hundreds of dollars per day in the case of mills of large capacity. During seasons when mills are losing money, some owners are not apt to examine, carefully, for heated journals or other dangers, *especially if fully insured;* and it is needless to remind an agent that a neglected journal will as surely burn a mill as will the match of an incendiary.

A neglected wooden journal will soon take fire. It may be seriously questioned if wooden journals are safe under any circumstances, or when running at any rate of speed, as, when not properly oiled, the slowest journals are certain to heat. Wooden journals, also, are generally in the upper stories of mills, where they are more liable to be neglected and more dangerous in case they ignite.

"Middlings Purifiers."—By this process, which is a simple system of sieves, with exhausts to remove dust, chaff, etc., the "spring" wheats make a better grade of flour than was formerly produced from the best grades of "winter," as well as a larger quantity (16 lbs.) to the barrel.

The fact that flour is ground coarser, or, technically, "higher" than formerly—the stones not running so close as under the old process—where the aim was to prevent, as far as possible, any flour from passing into the middlings—might be a favorable feature of the physical hazard if the process did not require a greater number of stones to do the work, which may counterbalance it.

Fire Appliances in Flour Mills.—There can be little question—in view of the rapidity of flour mill fires, and the danger of explosions, rendering ordinary appliances, such as force-pumps and pails of water, almost useless—that *steam jets* and *sprinklers* would be the most efficient of all fire appliances for flour mills, not only on account of the thoroughness with which they extinguish fire, but also on account of the readiness with which they may be applied. *In view of the strong suction draft of the exhaust box, a steam jet opening into it would be an admirable precaution*, and one which might be provided at little expense. The combustible character of flour-dust would be instantly neutralized by the volume of steam, which would find its way through elevators, chutes, spouts, exhaust boxes

and other places, where water could not be applied, and would extinguish a fire in a few moments.

The precaution of having the valves to steam jets and sprinklers outside of the rooms in which they are to be used is particularly important in flour mills.

GRIST MILLS, or mills doing a custom work only for surrounding farmers, with not over four run of stones, and with smut machines not above the first floor, are much better risks than merchant flour mills, as the neighbors and farmers are generally interested in their preservation, and the risks are free from the moral hazard usually connected with the speculative grinding of flour for the market. Submit surveys to company.

Floor Cloth. (See Oil Cloth.)

Flowers, Artificial. Stocks of. These are very damageable stocks, worse than millinery, and unprofitable to underwriters at obtainable rates. Where they are in honest hands, they are insurable at full rates, but few companies write them.

Florists' Stocks. Decline.

Foods. (See Cereal Foods.)

Foundries. Submit application to company. The amount insured on *patterns* should be very small—in no case exceeding fifteen per cent. of policy. They are often entirely valueless before a fire, but are sometimes claimed to be valuable after they have been destroyed. Not over one-half the value claimed for them should be permitted to be insured. Whenever a machine becomes unsalable, the patterns of its various parts become worthless, and a moral hazard attaches to the insurance of them. Very small amounts should be taken on *flasks*. After a casting, flasks should not be piled up where they may endanger the building in case they should take fire, as they sometimes do, from being overheated or from concealed sparks.

The roofs or ceilings over casting floors should be high enough to prevent their being endangered, in case of a "boil" or explosion of molten metal. Examine carefully the *core ovens*, and see that old wooden patterns, or other combustible materials, are not piled over them. The cupola chimney should rise, at least, 10 feet above the highest point of any roof within a radius of 50 feet, and roof should have a clearance around stack by at least

3 feet. The pouring floor and charging floor should be built entirely of fireproof material. Where more than the ordinary amount of woodwork is done, carpenter shop rates should be charged, unless in a separate building, where it will not endanger the foundry.

For pattern shop, if more than two men employed and power used, when in main building, or exposing same, an additional rate should be charged.

Frame Rows and Ranges. (See page 63.)

Fruit Evaporators. Are accepted by few companies, and only at high rates. The principal hazard is, of course, in the heating apparatus. The constant use of heat, as in the case of other risks where drying is done, subjects the woodwork to quick fires, if not spontaneous ignition. Confer with the company before binding, and advise fully as to the heating apparatus storage and care of fuel, etc., etc.

Fulling Mills. (See Cotton and Woolen Mills.)

Fur Stocks. A bad class, heavy claims always follow small fires—better decline stocks and get building or furniture and fixtures.

Furnaces. (See Blast Furnaces.)

Furniture Factories. (See Cabinet Factories.)

Garbage Crematories. Decline. (See Crematories.)

Gas Works. These are not necessarily dangerous risks when properly constructed. Applications should be referred to the company. The hazard of explosion, except for loss by fire, can not be assumed.

Gins. (See Cotton Gins.)

Glass Factories. The principal hazard is in the furnaces and ovens, and, like all classes of risks using fire heat, the woodwork is very ignitible. There should be no woodwork whatever near the furnaces. Where factories use natural gas for fuel, care should be taken to see that the supply of fuel is ample and that its exhaustion would not involve a moral hazard. Advise with company before binding.

Glove Factories. These seem to have been unprofitable risks to the companies, and stocks are very susceptible to damage by water and smoke. The physical hazard, however, does not seem

to warrant the mortality in the class. In safe hands, the risks, when properly managed, ought to be insurable at proper rates.

Glucose Manufactories. Refer to the company before binding, with full explanation, after a careful survey. They combine many of the hazards of starch mills, sugar refineries, kiln drying, &c., and full rates are needed.

Glue Works. These are generally nuisances, and should be declined.

Grand Stands at Race-Tracks, Fair-Grounds, &c., are undesirable risks and have been unprofitable as a class. Most companies decline them altogether. Underneath the tier of seats may be found quantities of waste paper, thrown away by patrons after candy, luncheons, &c., have been eaten, only to catch the falling cigarettes or cigar stumps after the crowd have left for the day. Obtainable rates are as a rule inadequate.

Grain Elevators. (See Elevators.)

Green Houses. These risks are not desirable, nor are risks on the plants contained in them, which are easily injured, if not killed, by smoke and water, or by the cold air consequent upon the breakage of glass in case a fire occurs in winter. Fires have been caused in green houses, also, by rats carrying combustible material to the vicinity of heating pipes. Plants often have fancy and extravagant values, *especially after a fire.* Modern structures, heated by steam or hot water, with boilers and heaters outside of main building, are written by some companies at full rates, but the company should be conferred with before binding.

Grist Mills. (See Flour Mills.)

Groceries. Wholesale. These risks have changed in character seriously of late years. They suggest to the average underwriter the nominal hazard of the old-time risk of sugar in hogsheads and barrels, flour and molasses in barrels, coffee in bags, tea in chests, &c., &c., whereas the modern wholesale grocery store is practically a compound special hazard, involving the risks of coffee grinding, and sometimes of coffee roasting; of spice grinding, frequently with old-fashioned wooden mills; of preserving, putting up of extracts, compounding, canning, cold rectifying, and other hazards which make ordinary rates ridiculously inadequate.

The following are the charges to be added to the building rate under the Universal Mercantile Schedule, and indicate the care requisite for insuring this class:

	WHOLESALE GROCERIES OCCUPANCY CHARGES*	Add for Build'g Rate.	Add for Contents Rate.
		Cents	Cents
1009	CLASS A. **GROCERIES.—WHOLESALE.**		
	Without manufacturing or any of the additional hazards specified below..........................	.....	40
	CLASS B.		
	If bottling wines, liquors, olive oil, blueing, or other preparations, with packing.............	10	40
	CLASS C.		
	If mixing and packing flour, starch, baking powder, cereals or similar substances; Or if printing..................................	15	45
	CLASS D.		
	If manufacturing flavoring extracts, essences or drugs; Or if rectifying by cold process only; Or if molasses reboiling or maple syrup mixing; Or if coffee milling, polishing, separating, mixing, and grinding, with power; Or if fruit cleaning with power or dry room, or bleaching with sulphur.........................	30	50
	CLASS E.		
	Or if coffee roasting, using only gas fuel standard equipment, fire proof floors, metal cooling pans, metal troughs, metal conveyors, and metal hoods over roasters; Or if spice grinding with modern iron frame mills.	40	60
	CLASS F.		
	If coffee roasting, standard equipment, using other than gas fuel..................................	50	70
	CLASS G.		
	If spice grinding with wooden frame mills.......	75	75
	CLASS H.		
	If coffee roasting, old style equipment, wooden floors, wooden cooling troughs, or wooden conveyors..	1.25	1.10
	*Charges are not cumulative. The higher rate in each case includes the less.		

It will be observed that the maximum charge for each class is not that fixed for the class in the schedule, which equitably takes into account that each process in the case of the wholesale grocery store is only an incident of the risk and not the entire occupancy of the building.

Gun Manufactories. (See Fire Arms Manufactories.)

Halls, With Scenery. Where the ceiling over the stage is higher than that over the auditorium, for the purpose of hoisting and lowering scenery, the rate should be the same as that of a theatre. (See Theatres.)

Small, country halls, where a simple raised platform, without traps, and perhaps two side dressing-rooms, comprise the only theatre feature, may be insured at lower rates; but all others should have a full theatre schedule applied. The woodwork of stage and wings, etc., should be painted with asbestos paint as a fire retardant. It is usually exceedingly dry and liable to ignite and flash into an uncontrollable fire.

Hardware Manufactories. Examine carefully the japanning process. It should be carried on in a thoroughly fireproof room or, better still, outside of the building. The buffing hazard is an important one, the fine polishing dust resulting from the process being peculiarly liable to spontaneous combustion. The room should be cut off from the main structure, and the dust should be blown out of the building through metal spouts or chutes. The working of celluloid for handles is a feature of modern cutlery factories, which is, of course, a serious one, and the company would want full advice. Where much woodwork is done, as for handles of tools, &c., the rate should be graded accordingly and the risk inspected with reference to the hazard of woodworking.

Hardware, Stocks of. Few classes of hazards are more inadequately rated than these. They damage easily by fire and water. The burning of paper wrappers only on shelves, even where the fire is extinguished, is apt to injure the contents by taking the temper out of steel and by discoloring handles, &c. The sale of kerosene, alcohol, turpentine, benzine and paints is frequently carried on in connection with these stores and adds very much to the hazard, especially where the handling of such dangerous fluids is entrusted to clerks not acquainted with their danger.

The average retail druggist knows how to handle these materials, and this is one reason why the percentage of loss to premium in the case of retail drug stores is less than that of hardware stores.

Hat Factories. These combine many hazards—drying, bleaching, felting, &c., &c. They should be referred to the company, and sometimes need the careful inspection given to cotton and woolen mills. The wool felt factories carry with them the hazards of woolen mills and should be inspected for the same risks as that class; the hazard of the picker and card room being greater than that of most woolen mills, because of the low grade of stock used and the necessary flyings in the card room, this portion of the risk being usually very dirty. Fur felt hat factories do not involve all of these hazards, the chief being the drying and heating of slug irons. In straw hat factories the hazards are, of course, bleaching, drying and pressing.

Hay in Stacks. Decline, unless close to the barnyard. Isolated hay cocks in meadows and on prairies are uninsurable. A creeping grass fire set by careless gunners, or by sparks from locomotives, will burn up enough of these in a year to prevent their being profitable at any obtainable rates.

Hay Presses or Barns. These should not be insured without the consent of the company first obtained. They are usually by the side of railroad tracks, great carelessness is observable as to loose hay and straw about the doorways, and they are not always commercial successes. They are especially dangerous when run by steam power, with the usual arrangement of boiler-room, &c.

Hemp and Jute Mills. These should be declined as a rule. Under no circumstances should they be taken without the consent of the company first obtained. They have been a losing class, and always will be until the owners take precautions which they are deterred from taking, as a rule, because of the expense of safe construction.

The principal hazard is in the necessarily large amount of waste in the working of the material, some of the processes being very dirty; jute particularly is subject to spontaneous ignition when damp.

Henneries. With incubators, refer to company before binding.

Hominy Mills. These are undesirable at obtainable rates. They are usually cheaply constructed and careless in management.

Hop Houses. Do not bind without consent of company. Standard: brick; metal roofs; floors of stone, brick or earth—never wood. First floor at least 12 feet high. Hop kiln joists 12 feet above heating pipes. Pipes riveted at each joint, or wired with continuous wire, fastened around pipe at each joint: and must enter good brick flues—never pass out of side wall, window or roof. Vessel in which brimstone is burned should be covered with perforated iron. Pipes and stoves should be dusted off thoroughly after each drying. No open lights. No kerosene. Baling done by daylight only. Barrels of water and pails. Constant watch during drying season. Stationary ladder attached to side and roof of kiln. If wooden kiln, line the sides with metal; and heating pipes must be at least 24 inches from wall. Front wall around heater must be brick, or protected by space not less than ten inches, and lined with metal.

Basis Rates.	B Class Brick, Metal Roof.	C Class Brick, Shingle Roof.	D Class Frame.
Hop kilns, without drying privilege	1.50	1.80	2.00
Hops, in storage house or cooling room	1.50	1.80	2.00

But not less, in any case, than the building rate, if building rates are higher than above.

Hops while contained in kilns, or in buildings exposed by drying, must be written at above basis rate for hops with the following additional charge for drying privilege:

Class B, \$1.70 Class C, \$2.00 Class D, \$2.50

This charge for drying covers one season only, and no deduction is to be made for shortness of term.

Any building provided with apparatus for drying hops must be written for a term not exceeding one year and be rated as a hop kiln.

Hop kiln should be at least 100 feet from storage or cooling warehouses.

Hops in Bales. These were regarded for years as good stocks to insure, and there is no inherent fire hazard to justify the heavy loss ratio, which is due rather to the fact that when a fire once starts the hops are easily injured by smoke and water, as well as by fire, and claims, where owners are not conscientious, are so excessive as to make it safe to decline the risks. Hops in bales in disinterested custody, stored in warehouses, not those of the owner himself, are insurable at proper rates—not less than 1 % in any case.

Horse Cars in Horse Car Stables. These are usually insured under a blanket form which insures total loss to the insurance companies and a low rate to the car companies. Where insured,

the policy should have the 80% co-insurance clause attached. (See page 438.)

Hosiery Mills. (See Woolen Mills.)

Hospitals. Decline those exclusively for contagious diseases, pest houses, etc., especially where their presence will be objectionable to neighbors. As I write the destruction of one by a mob at South Omaha illustrates the danger. It was a smallpox hospital. Neighbors naturally objected and it was totally destroyed.

Hotels. A hotel with the laundry and kitchen outside, or in a fire-resisting room, heated by steam, ought to be a profitable risk at ordinary rates, and would be were it not for the fact that the guests are not always of a careful character, and intoxicated parties are liable to be careless with lights, cigars and fires. The laundry should be completely cut off from the hotel building, and the kitchen should be safely arranged. Most hotels, however, are fire-traps, and the annual mortality of the class is so great that if the facts were known to travelers they would be appalled as to the risks they run. Probably few underwriters take the trouble to inspect hotels while traveling for their companies. They might well do so, in their own interest as well as in the interest of their companies and of the community. Every cause of fire removed tends to cut down the fire loss. Two of the most frequent causes of fires are almost universally overlooked, viz., the proximity of window curtains to open fire-places and to gas jets, where a current of air coming through the open window would blow the curtain inevitably either into the gas jet or the fire. Sawdust spittoons are commonly used, and a lighted cigar thrown into one of these late at night is almost certain to escape the attention of sleepy employees.

There is no reason why a hotel, with its cellular construction, so to speak, of divided rooms, like bulkheads, and its comparatively harmless processes, should not be among the safest of risks, with reasonably slow-burning construction, which would not be expensive. They are safe risks in every country except our own.

Season Hotels, Seaside Resorts, Summer Hotels, Sanitariums. These as a class have not been profitable, except where the greatest intelligence has been observed in noting the question of whether or not they are commercial successes.

Where they have become unprofitable for any reason, losing their trade, especially in the case of health resorts, they should be declined. They are usually constructed in the cheapest manner, ordinarily of frame, *with a single staircase*, which would cut off the escape of the inmates and prevent any intelligent effort at extinction in the early stages of a fire.

Hotel Furniture. Few classes of property are more liable to depreciation from wear and tear than hotel furniture. Second-hand, partly worn out hotel furniture will not sell for twenty-five per cent. of its original cost, and if stored and not in use should be regarded as uninsurable above this percentage of original value. A serious moral hazard is often involved.

HOW TO BUILD A HOTEL.

In view of the number of fires occurring, almost daily, throughout the United States, in buildings occupied as hotels, resulting, in only too many instances, in loss of life, it would seem clearly to be the duty of everyone possessed of knowledge, no matter how acquired, as to ways and means of preventing fires, to give the benefit of that knowledge to the public, and particularly to those about to erect hotels. With this conception of duty, I have prepared the following pages. They are the result of careful study of the fires occurring in hotels throughout the past twenty years—not only those insured by my own company (themselves not few in number), but those which have occurred, whether insured or not, from Maine to California.

Not content with my own theories and investigations, I have taken the precaution to send the proof of these pages to various experts of my acquaintance—underwriters, adjusters, architects, builders, and to hotel proprietors themselves, with request for a careful revision and suggestions, holding that everybody knows more than anybody. Having taken such pains to secure a consensus of judgment, I present the result to those who may be interested, without diffidence, because I can claim they are not my own ideas merely; and that those who contemplate erecting structures which are to shelter, during the night hours of greatest danger, their fellow-beings who will be helpless because unconscious, will do well to study and follow the advice presented. Certain considerations are of such vital importance that it would be almost sufficient to name them merely, without argument or explanation, were it not that much of the detail necessary to carry them out would not be understood by those owners who have not practical knowledge of construction.

Unfortunately, those who build hotels seem to lose sight of the fact that there is a happy medium between a fireproof hotel and a tinderbox of frame, and that this medium can be reached by a slight advance in the cost of building, as compared with what might be termed rapid-burning construction as opposed to slow-burning construction. One great secret of securing the

latter is the simple one of cutting off air drafts in the hollow spaces of partitions and enclosing walls which run from story to story and not only facilitate the spread of the fire, but contribute to its intensity; and the further important point of providing suitable exits for the inmates, especially by enclosing the staircases either with fireproof walls of brick, or of burnt clay blocks in T and angle-iron frames, or by filling in solidly between the wooden studs of combustible enclosing walls with ordinary brick and mortar. Even this last economical form of construction would probably hold a staircase for safe exit of all the inmates.

It is with this view of the importance of the subject that I have prepared the following pages (which have also been printed in pamphlet form, for the use of those who contemplate erecting hotels), in order that when applied to for information the Insurance Agent can offer his patrons valuable information, which will save not only money but life.

I have combined with the points as to construction some practical suggestions with regard to arrangement of rooms and other matters which I have secured after conference with hotel men and other experts, and after careful personal observation, for many years past, while traveling from one city to another. Some directions (as to flues, for example) are repetitions of previous ones in this book, but are inserted here in order that one studying the subject will find all under one head.

HOW TO BUILD A HOTEL.

Construction. Fire resisting construction* for hotels involves considerations so simple that they should occur naturally to any thoughtful person. The most important of these is the prevention of air drafts which would draw flame from one story to another. Almost the earliest practical lesson learned in life in connection with fire is that combustion is accelerated by a good draft, and that fire, for want of a draft, will burn slowly, if, indeed, it does not expire, as it certainly will if deprived of oxygen, even to the extent that a closed room of small dimensions has been known to suffocate an ordinary flame. But the child, who learns to open the drafts of a stove, both in the stove-pipe and at the bottom of the stove, seems to forget, in maturer years, the danger of having such drafts in the building in which he lives and sleeps as are afforded by staircase shafts, elevator shafts and the hollow spaces in the partitions and outer or enclosing walls. The dimensions of each upright flue between the studs of a partition

* To those wishing to build fireproof hotels, a pamphlet on "How to Build Fireproof" will be sent upon application.

are often greater in square inches than the throat capacity of the chimney of the house, and flame getting access to such air passages in improperly constructed buildings will go more rapidly from cellar to roof than through a chimney to find an exit.

I, therefore, dwell first upon the importance of cutting off all communications from story to story, of whatever character, as the most important step to be taken to insure slow combustion, rapid extinction and the confinement of a fire to its floor of origin. The maximum of safety and the minimum of danger would be secured if the only passageways, staircases, elevators, etc., for getting from one story to another were entirely outside of the building. This, of course, is not always practicable, but it is entirely practicable, and ought to be a provision of every building law, that all communications from story to story should be in a separate enclosure tower of brick walls, with fireproof doors at the openings; and in buildings of larger ground floor area than five thousand square feet there should be at least two such systems of staircases, one at each end of the structure. In these separate enclosures, or brick towers, the staircases, elevators, dumb-waiters, risers for water pipes, gas pipes, &c., &c., should be carried, and especially the stand-pipes for supplying water for the extinction of fires, so that the latter, with outlets for hose near the stairways, could be used to the last moment by firemen or by the employés of the hotel. They can be built flush with the outer walls, so as not to interfere with architectural effects. Revolving doors, glazed with wire glass, would prevent passage of smoke.

The inmates could escape by means of stairways so enclosed, without danger of being burned. Stone stairs or iron stairs with stone treads without an iron web beneath the stone are dangerous, as they crumble if exposed to fire.

These enclosed hallways should be lighted throughout by whale or lard oil lamps firmly attached to brackets, at a sufficient height (seven feet) from the floor to prevent their being knocked off by hurrying persons, (or in a pocket

in the brick wall, in which the lamp could be placed, with light metal frame door and red glass in same, with small vent holes in frame for ventilation. This should be kept locked to prevent removal of the lamp), so that in case the gas or electric-light should be cut off by a fire, as electric-light and gas systems nearly always are, these avenues of escape would not be darkened.

Oil lamps, with red glass, should be displayed where they can be seen throughout their entire length, to indicate the doors to the staircases. In fact, all hallways of a hotel should be lighted with whale or lard oil lamps or candles by night, the lamps being so arranged as to illuminate plainly printed directions to the staircases. Gasolene must not be used, and kerosene is objectionable.

Lamps should be so secured that they cannot easily be taken to rooms for heating curling irons.

Hotel halls should be straight and without turns, so that the line of vision is clear from one end to the other, thus facilitating the escape of guests in the event of fire.

I regard these suggestions as among the most important for the safety of life, and I am confident they would be so pronounced by every practical fire department chief throughout the country.

FRAME OR WOODEN HOTELS.

It is not always practicable, especially in some locations, to build expensive brick or stone hotels, and frame buildings are a necessity. The average man, however, who is not an expert in construction, assumes that a frame building cannot be made slow burning. This is a great mistake and an unfortunate one, for such a conclusion usually results in a fire-trap, when a few dollars of expense in directions which would add to the life of the structure might secure the escape of the inmates and possibly result in the extinction of the fire and the saving of the building.

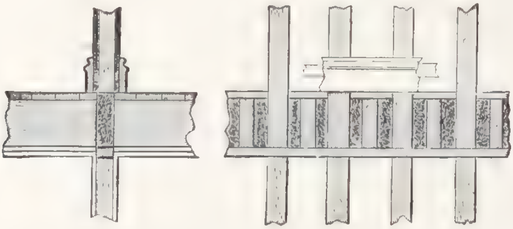
An ordinary frame building may be made to burn slowly by attention to suggestions already made as to cutting off drafts. *At every story the space between the floor beams*

and the upright studs, both in partitions and in the enclosing walls, should be filled with bricks and mortar or gravel and lime mortar, care being taken not to enclose wooden beams in cement or plaster of Paris, as it will cause dry rot. Lime mortar protects wood. The filling in of partitions and side walls should be to the top of the "mop boards" or base boards. A fire getting into these upright wooden flues, filled in this way, would not go rapidly from story to story. In most frame hotels there are thousands of well-developed flues of this character. One of the finest wooden hotels in the South, built by an owner who had no need to economize and probably did not desire to, was constructed without fire stops, the elevator shafts being actually sheathed or lined throughout with pitch pine. As the hotel is seven stories high in places and thousands of feet long, the danger of spread of fire may be imagined.

At each story, therefore, where stud-walls or partitions rest on walls or other partitions, the spaces between the floor-joists immediately under such walls and partitions, and between the sides of such joists, and to a line six inches above the top of such joists, should be filled solid or flush, with face of plastering on both sides, with bricks laid in mortar; and if such studs or partitions rest on solid timber or joists for the whole length thereof, such fillings should be placed from the top of such joists to the same height as above specified, or a strip of tin or galvanized iron at least one inch wider than the width of said studding, and continuing under the footing of such walls or partitions, may be substituted for the filling above described where there is no partition or wall under. 25 cents per $100 or $2.50 per $1000 of insurance should be added to the insurance rate for omission of this precaution. The cost per 100 running feet of three story wall would be less than $100, and this would be saved in time in the insurance rate, to say nothing of life.

The building law of New York requires that in all furred walls the course of brick above the under side and below

the top of each tier of floor-beams shall project the thickness of the furring, more effectually to prevent the spread of fire.



FIRE STOPS IN FLOORS AND PARTITIONS.

A cheap fire stop could be constructed of ordinary slush mortar, filled in between the studs solidly to the top of the mop-boards. (Lime mortar will not rot wood, in this respect being unlike cement or plaster of Paris, which should not be in contact with wood.) Broken glass mixed with this mortar will prevent the passage of rats and mice, or cheap, fine meshed, galvanized, wire netting may be inserted to answer the same purpose. If "back plastering" is used, so as to provide two air spaces between the inner plastering and the outer sheathing, the hotel will be cooler in summer and warmer in winter.

Even where the hollow spaces are not filled in with brick between the upright studs, a heavy "plate" at each story over the studs below for carrying the studs above will delay the spread of a fire for a while, and where the studs are securely fastened to the plate, being tenoned or toe-nailed to them, very sturdy construction is secured.

A wooden building constructed in this manner, with all air-passages cut off, with metallic lathing for the ceilings, and salamander, asbestos, or other fireproof material between the floors, will resist a fire much longer than ordinary brick or stone buildings in which such simple and inexpensive, but most important, precautions are omitted. It will not cost much to construct a building in such a way that ample time would be secured for the escape of the inmates even if a fire should start in the night, and it is

almost criminal to erect buildings for the habitation of human beings on modern fire trap principles.

Take, for instance, the simple precaution of throwing a few shovelfuls of ordinary lime mortar into the hollow spaces at the feet of ordinary "fore and-aft" partitions, such as those which divide rooms from hallways; it would seem that a conscientious builder, even if he were not paid under his contract for taking this precaution, would not neglect it. If at every floor he should let his workmen cast in the broken bits of brick, loose mortar and incombustible material which he afterward carts away at an expense, he would make a partition almost as fireproof as if filled in with brick from top to bottom, it being borne in mind that the danger of an ordinary partition lies, not in the fact that it is not filled in solidly with brick, or that it has an air-space, but that this air-space extends from one story to another, creating a flue for a draft. This matter is more fully explained by the accompanying illustration.

Fire Divisions. Where a frame hotel is a necessity, it should be cut up into sections not longer than 100 feet each, and the ends of the sections facing each other should be of brick, separated, if possible, by a space of fifty feet or more. A fireproof, connecting bridgeway on the first floor will secure the convenience of one structure. The end brick or stone walls should be carried above the roof and beyond the line of rear and front walls, so as to prove a sufficient barrier to the spread of fire from one division or section to another. Fire shutters provided to the windows in the ends which expose each other would be an admirable precaution, but I presume would be regarded as an expensive feature. Wire glass in metal frames would answer the purpose.

Roof. Avoid mansard roofs, they are fire traps. Shingle roofs to porticoes and piazzas under bed room windows, are apt to be ignited by castaway cigars and cigarettes.

Revolving Doors. A revolving fireproof door, glazed with wire glass, in the hall opening through walls dividing large hotels into sections, would be an admirable precaution,

and preferable to an iron or tin-covered wood door, for the reason that escaping inmates could see through it and use it without leaving it open.

Floors. Wooden floors should be double, one course being laid diagonally crossway of the other. "Salamander" (a fire retardant constructed of heavy strawboard covered with fireproof cement, both sides, so that it is like a piece of slate) or sheet tin, or sheet iron, or asbestos between floors would tend to retard the passage of fire. The floors should be deafened in any case, for the comfort of inmates, to prevent the annoyance of noises passing from one story to another. This should be done by deafening boards on cleats nailed to the beams, with lime mortar or concrete laid on the deafening boards, and an air space between the top of the deafening and the floor boards above. This would give two air spaces between the plastered ceiling of the room below and the floors of the room above, and would also be a partial fire stop.

In frame hotels the staircases should be protected in brick towers, even if no other brick is used in the building, and the ventilating shafts should be of burnt clay blocks in "Tee" or angle iron frame work, if the owner cannot afford to construct of brick. There should be nothing whatever of a combustible character in any shaft going from floor to floor, as already stated.

Kitchen. The kitchen, as the greatest source of fire, should be cut off from the main structure. Where the owner cannot do this, even solid double planking between the kitchen and the hotel may hold a fire sufficiently for the escape of the inmates, as compared with a hollow wall of the usual kind. It would cost little to put a brick or stone wall between the kitchen and the main structure, with tin-covered door and frame with iron or stone sill, and this should be done.

Laundry. This should be cut off, also, as it is unnecessary to have it so situated as to burn the hotel by its numerous fires in dry-room, ironing-room, &c. It can at small expense, especially where land is cheap, be located where

it would burn without endangering the main structure. A cheap fireproof dry room can be made of sheet or corrugated iron on angle and Tee iron frame. For further suggestions as to laundry, see page 496.

Staircases. These ought to be enclosed with brick walls. The next best is with T and angle iron framing and 4-inch burnt clay blocks, plastered on both sides. If the owner cannot afford to do this, he would do well to use double planking for the enclosure, especially if covered with tin, so as to prevent the rapid flashing of fire.

Elevator Shafts. These should be enclosed in brick or terra cotta, in the same manner as suggested for staircases.

The suggestions as to the construction of chimneys and fireplaces elsewhere stated, as to the kitchen, dining-room, laundry, slop closets, toilet-rooms, fire appliances, and especially the simple and cheap but effective pails of water, all apply to frame hotels. To the extent that an owner feels he can afford to go in recognizing some of the other suggestions made hereafter under the head of brick and fireproof hotels, he must, of course, be the judge.

The following description of "The Mount Washington," a frame hotel located at Carroll, N. H., will show how thoroughly practicable it is to erect a wooden building on slow-burning lines which will probably insure the escape of the inmates in case of fire :

"The building is substantial frame, covered with Portland cement on expanded metal on a first-story of stone. Roofed with an approved felt roofing. "Plates" form fire stops at each floor, in addition to which spaces behind mop-boards (6 inches high) are filled in with concrete, and joists are filled in above all girders with concrete flush with floor, forming stops in all horizontal spaces. Finish is hard plaster on metal lathing. All concealed spaces between studding and joists, including both sides of first layer of floor boards, were painted with approved fire retarding paint (asbestine) before applying finish. Interior finish generally painted with similar paint or oil paint, underlaid with fire-retarding paint. Elevators in fireproof shaft of metal and hard plaster, with standard fire doors. Several good cut-off doors in each corridor above first. Heat, steam from outside. Light, incandescent electric from outside. To have hydrants outside supplied from reservoir on mountain at about 70 lbs. pressure through large mains. Standpipes and small hose throughout. Grinnell *automatic sprinklers in all hazardous portions, including entire kitchen, entire basement, elevators, porters' rooms, coat rooms and upper corridors.* Laundry is in separate building. Drilled fire department of employés Ample

fire escapes. Watchman and watch-clock. All woodwork, exposed or otherwise, is protected by approved fire retardants of the best grade, and concrete stops are used freely to prevent any joist spaces from acting as flues to convey fire."

BRICK OR STONE NON-FIREPROOF HOTELS.

It is safe to say that the majority of brick and stone hotels, whose enclosing walls suggest to the inmates conditions of safety, if not of fireproof construction, are simply fire-traps of the worst description, like the Windsor Hotel of New York; infinitely less safe than the slow-burning, frame construction already explained. Their brick or stone walls simply envelop cheap frame interiors, with hollow spaces between plaster furring and the outer wall and between the lath and plaster stud partitions separating the rooms, which would literally breathe fire from cellar to roof.

Outer Enclosing Walls. The best masonry for fire resisting purposes is good, hard burned brick. Stone is not so safe, especially limestone, granite, marble, etc. It is certain to disintegrate under the combined effect of fire and water, and should not be employed even for templates on which to rest the ends of beams in the brick wall; cast-iron templates should be used for this purpose.

Roof. If the hotel is not of fireproof construction, a metal roof of tin is better than slate or composition. Slates are apt to crack with the heat and open up drafts. Moreover, they involve a pitched roof, which implies an empty roof space—always objectionable from a fire viewpoint. If the building, however, is fireproof the roof should be in keeping with the best methods of fireproof construction, and any cheaper construction will be shortsighted and inconsistent.

Mansard roofs are decidedly objectionable. Their construction favors rapid burning; even where the framework is of T and angle iron it is not usually protected, and the heat of a fire will cause an early collapse of the roof. A mansard roof has been aptly described by an experienced fire chief as a lumber-yard on top of a building. Where

hotel fires get into the hollow spaces of a roof, they are seldom extinguished short of total destruction.

Plaster Corners. These should be avoided if possible, but where unavoidable should be protected by wooden corner guards, to keep the plaster from being knocked off by moving trunks or furniture.

Elevator Shafts should be of fireproof material. Brick is best for enclosing walls. Under no circumstances should they be sheathed with wood, or with plaster on wooden lathing; and the slide guides from top to bottom of the shaft for the elevator car should be of iron; they are usually of wood, which becomes soaked with oil and the medium of rapid ascent of fire. It is quite common in hotels to sheath these shafts with yellow or pitch pine, of the most ignitible character. Such was the lining of the shaft in the Park Avenue Hotel, in whose disastrous fire twenty lives were lost in February, 1902. This building was in many respects one of the best fireproof hotels in the country, having brick segmental arches in the floors. It had, however, strangely enough, elevator shafts sheathed with pitch pine; one of the upper staircases was of wood, and some of the partitions of rooms were of ordinary wooden lath and plaster. If the inmates had remained in their rooms, however, they would probably have saved their lives. They sought exit through the hallways and were suffocated with smoke while trying to escape.

It may be mentioned here that few people are burned to death in fires; fortunately the gases and smoke of combustion suffocate them before they experience the torture of being burned. If the unfortunates in this instance had shut their doors and windows, the fire department would have extinguished the fire and rescued them.

The insurance rate increase for wooden sheathing in elevator shafts is 25 cents per $100, ($2.50 per 1000), a lifelong tax.

The great loss of life in the Windsor Hotel fire, of March 17, 1899, was due to the fact that the fire spread rapidly from top to bottom of the hotel because the windows on

every floor of the building were open, to enable the inmates to see a procession which was passing at the time, presenting the condition of a stove with the lower and upper dampers open.

In view of the fact that elevator shafts act as chimneys, furnishing a strong draft to drive fire from the lower floors to the upper stories, they should have nothing ignitible in them. Where iron grillwork is used, wire glass should be provided behind the grill, and any sash doors should be of wire glass.

In the New Willard Hotel, in Washington, the doors to the elevators are glazed from the top of the door to within about three feet of the floor, which enables the operator to see those waiting at landings.

A brick staircase tower built flush with the outer wall is not unsightly, and one such at each end of the structure would probably afford safe egress for all of the inmates. If the entrance to this tower is arranged at each floor from an outside iron balcony, it will prevent the tower from becoming filled with smoke.

It is, I think, a mistake to have staircases surround elevator shafts, practically in the same opening, where ascending smoke and gases would suffocate escaping guests. They should be separated.

Lamp closets, oil closets and waste closets should not be near the elevators, for obvious reasons, as a fire starting in them would rapidly spread through the shaft.

An inexpensive elevator shaft, which will hold a fire for a considerable time, is one built of porous terra cotta blocks, using 6 inch blocks for the lower story and topping out with 4-inch ; wire lath and plaster both sides ; Tee and angle iron frame ; no constructional work should enter this at any floor.

The bottom of the elevator shaft should be cemented and so constructed as to prevent the accumulation of rubbish, waste paper, &c. It is not unusual to find shavings, rubbish, oily waste and other dangerous material at the bottom of elevator shafts. They should be watched

carefully and kept clean. All elevator shafts should extend six feet above the roof.

Ventilating Shafts. It is, of course, necessary in hotels to have ventilating shafts especially on lines of bath rooms and toilet-rooms. These shafts should always be thoroughly fireproof, without any woodwork whatever in them. They are too frequently, like elevator shafts, sheathed with wood or finished in plaster on wooden lath. The windows opening on them from bath-rooms should be of metal sash, with wire glass, and care should be taken that nothing to start a fire is allowed near the bottom of the shaft. If the owner is not willing to go to the expense of brick or fireproof terra cotta block construction for these shafts (and he ought not to assume the care of his fellow-beings by night and day unless he is), metallic lathing, of the wire netting kind, should be used, as it is a valuable fire retardant.

Wire Lathing. Plaster on wire lathing will prove more economical than wooden lathing, as the latter results in cracked ceilings, owing to the fact that the wooden laths are often nailed too close together and sufficient plaster is not pushed through the interstices to "clinch" or "key" and make a good job. There can be little cheating by the plasterer if wire lathing is used ; sufficient plaster must be pushed through to get a good "clinch" on the back of the wire netting. The result is a job which lasts longer and resists fire and water sometimes for hours. While the initial cost of metallic lathing is somewhat greater than for wooden lathing, it will prove the more economical in the end, if the building should last for say ten years. I do not like expanded metal lath as well as wire lathing.

Chimneys, Flues, Etc. A correspondent writes me as follows:

"In adjusting a loss by lightning on a large new frame school building, I found the chimney demolished. It was built from the ground, extended inside the studding up one end of the building to the end joist of the second floor; here the flue builder dropped out two inches to pass the 2″ x 12″ joist by setting a few courses of brick on edge flat against this joist, enlarging the flue to its usual size from top of the joist to the next floor, and so on; in other words, the front of the chimney was carried up even, so when complete it was a brick chimney

with a 2″ x 12″ pine joist running through it at the top of each story. Fortunately the stroke of lightning saved a fire, which must inevitably have occurred, and probably saved the lives of many innocent school children. At last accounts this contractor who built the job was still at large, but he ought not to be"—

in which conclusion I agree with him.

Flues should never be surrounded with less than eight inches of good brickwork, laid in cement. A further precaution would be to line them with tubing of cast iron or burnt clay; but a 4 inch or "half brick" flue lined with burnt clay is not so good as one surrounded by 8 inches of brick, for the reason that it is seldom faithfully constructed. The interior capacity of a flue, especially for a fireplace burning wood, which is not always dry, should be not less than eight inches by twelve. It should be carried well above the roof, and in the case of a shingle roof, well above the peak, and the flashing around the chimney should be of copper or other metal, securely cemented into the groove or joint in the brickwork for a height of at least 8 inches above the roof, and lap over the flashing below, which should extend up 7½ inches above the roof, but the lap should not be within one inch of the roof. (Note.—This to prevent ascent of water by capillary attraction.) Where shoulders occur in a roof, tending to lodge snow, crickets or pitch roofs should be made to slide snow beyond the chimney and prevent its piling up behind it.

The chimneys should be carried straight up from the ground and not drawn to one side to reach convenient opening places on upper floors. Above the roof black cement mortar should be used, and all smoke-flues should be carefully watched while being built, from the bottom of the flue or from the throat of each fireplace continuously to the extreme height of the flue. Some contractors save brick without regard to possible loss of life. The ends of the lining-pipe should fit close together, and the pipe should be built in as the flue or flues are carried up. All flues for fireplaces should be of a capacity 8″ x 12″, and the furnace and range-flues should also be 8″ x 12″ inside capacity. Vitrified drain pipe makes good flue lining.

All flues which are not lined should have struck joints; no parging or plastering should be allowed on the inside of any flue. All flues should be lined, however.

A builder of long experience and practical ideas* writes me as follows:

"I dislike a stone cap on the top of a chimney. If you wish a down draft and a smoky room put on a broad margin stone cap and you will get it every time. I run every flue lining say four inches above my top course of brick; batter back one-half inch each course until I get to full size of chimney, and parge off the top course to within one inch of the top of lining with best Portland cement. Here is a top that as the wind strikes it creates a vacuum in the flue; the sharper the top of the chimney the better the draft."

I think his suggestion a good one, as the effect of the wind from any direction on such a chimney top is to help the draft, not to interfere with it.

It is claimed by the same gentleman that an 8″ x 12″ flue will draw better than a circular flue. He writes me:

"I keep a space of one inch between the lining and brickwork, for the reason that the brickwork will settle, while the lining does not; at the joints of each 2″ length of lining I corbel out a brick to just bite the lining at the centre of the joint; I also plaster the chimney inside to full height and outside to roof cover."

Fireplaces. The back of all fireplaces should be inclined toward the front, beginning six courses of brick from the floor of the hearth, as per drawings (see diagram, page 89), to secure a good draft, and the fireplaces should be lined with firebrick, laid with close-rubbed joints (or with cast-iron fireplace-lining, as per design and pattern specified, if cast iron is preferred). The front opening of all fireplaces should be supported by two iron bars $\frac{1}{2}$″ x 2″, 9 inches longer than the width of the opening, and should be fitted with automatic ash-dump grate.

It will also be observed in the illustration (page 89) that a level shelf appears in the flue above the fireplace opening. Descending currents of air and smoke strike this shelf, rebound, and return up the chimney without puffing out into the room. It is possible, and sometimes necessary, to have a cast-iron plate resting on this shelf, so that it can be drawn forward as occasion may require, to contract the throat of the flue, the capacity of which, as already stated,

* Mr. J. C. Hosmer of Boston.

should correspond somewhat with the size of the fireplace opening, to the extent of having an area about one-tenth or one eleventh of the latter.

The Murdock Grate Company's throat damper, which has a flange in front for support of opening, and is worked by a drop lever easily with a poker, is an admirable arrangement.

No chimney should be enlarged where it passes the roof to form any overhang or projection over the roof.

The chimney walls from the cellar to first floor may be carried up to form ash pits, securely inclosed with brick-work, these to have 12″ x 16″ iron doors, with frame, in cellar, to be built in during construction.

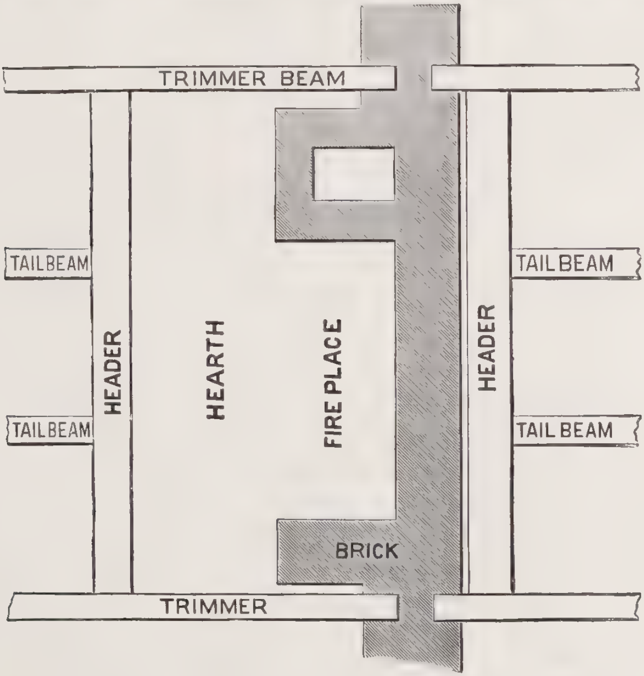
Chimneys must be built from ground. No chimney should be started or built upon any floor or beam of wood, and in no case should a chimney be corbeled out more than 8 inches from the wall, and in all cases the corbeling should consist of at least five courses of brick.*

All hearths should be constructed with trimmer arches extending 20 inches from the chimney-breast to a "skew back" or wedge-shaped piece of wood spiked to the header-beam, and the top of the arch should be filled with 2 inches of concrete to the top of finish floor. The header-beam should be double tenoned into the trimmer-beams and oak pinned. Stirrup iron construction is apt to cause cracks in plastered ceiling, because of difference in shrinkage of header and trimmer-beams; and there should be no wooden lath or furring on the chimney-breast.

It will be observed in the illustration, (page 89), that the trimmer-arch abuts upon a wooden skew back or wedge of wood securely spiked to the header-beam. The skew back is in turn supported by a fillet of wood spiked to the beam. This is necessary to secure a proper arch. If the footing of the arch comes squarely against the wooden header-beam the shrinkage of the latter will in time release the arch and allow it to fall. It is however, unfortunately the practice not only to omit this skew back, but to omit

* This is a provision of the New York building law, and it ought not to be deviated from in any case.

the trimmer arch altogether, and to support the hearth directly upon the floor-joists. This is a most dangerous construction, and a fire is only a question of time. It seems incomprehensible that an honest builder having any decent



FIRE PLACE SHOWING HEADER, TRIMMER AND TAIL BEAMS.

regard for safety to life would build in this way; and yet fires from this cause are frequent. In one case coming under my observation serious damage was done to a handsome dwelling, where the builder had not only constructed the hearth in this way, but had actually swept the wooden shavings from the floors into the hollow spaces under the hearth. But for the fact that the fire was extinguished in time to discover this evidence of criminal indifference to human life, the guilt of this builder, who was no better than a would be murderer, would never have been known. The writer cannot too earnestly urge the importance of watching the construction of chimneys, hearths, etc. It involves small expense, but important consequences.

English tile 8 inches square and 2 inches thick forms a good hearth, but is more expensive than the concrete.

Laundry. The laundry, unless in a thoroughly fireproof room, should, in all cases, be outside of the building, where its burning would not expose the hotel. In any case, the dry-room should not have any woodwork about it. The usual construction, even in the best hotels, is a network of steam pipes on the floor, above which the clothes are hung, shoved in and out on movable racks. Wood continuously subjected to heat becomes so ignitible that it has been suspected of spontaneous ignition. At any rate, a garment falling upon the steam pipes below, or a match or flame touching the dry woodwork, would cause immediate combustion. Steam pipes should be protected with wire netting to prevent their getting in contact with fallen garments from the racks. To cover wooden or plastered ceiling above, or the side walls, with sheet iron is not a sufficient protection, although if the metal were kept far enough away from the woodwork to leave an air space behind it, the woodwork would probably not be ignited. Most people make the mistake of nailing metal shields to protect woodwork tightly to the woodwork itself. It should always be kept away from wood, as iron is a conductor of heat, and air is not. A space of even half an inch would tend to safety. Sheet tin is much better for this purpose than sheet iron, because of its reflecting qualities.

The laundry building should be not over one-story high, provided with a monitor skylight for ventilation and lighting purposes. A steam jet is an admirable fire-extinguishing precaution for the dry-room, and fire pails filled with water should be liberally provided.

The floor of the laundry should be concrete with cement surface, mixed one part cement to three of sand. It would be well to float the floor to a drain with bell trap in the center of the room. If irons are heated by electricity, National Board rules should be followed.

Kitchen. This should be outside of the main structure, unless thoroughly fireproof. Care should be taken to see

that the bake oven is not near woodwork of any kind. Instances have been known where wooden posts have been ignited through 20 inches of brickwork surrounding boilers and ovens. The kitchen should be of liberal size. Any experienced *Chef* will emphasize the importance of this suggestion. The vegetable bakery, the butcher shop and the pot-cleaning rooms should be separate, cut off by fire-proof doors ("Underwriters" tin-covered wood pattern), with iron or stone sills. It is quite common to neglect this latter precaution as to sills.

It would be well also to have the entire floor of the kitchen of concrete or cement, or of brick or tile.

Range. The range should not rest on wooden beams or flooring and should have a hearth projecting not less than 3 feet in front of the same and of the full width of the range, of best quality of rubbed slate, 3 inches thick (or stone or encaustic tile laid in a proper manner).

The range should have a ventilating-flue by the side of the smoke-flue not less than 8 inches square, in addition to the smoke flue, which should be not less than 8″ x 12″, lined with tile. *The range must not be set next a stud lath and plaster partition.*

Dining Room. This should have a high ceiling, to secure ventilation without drafts, with windows in the "clere" story and be on cool side of house. The best arrangement of this kind I have seen is that of the Royal Poinciana.

Where a high ceiling cannot be provided, making it necessary to open the lower windows to secure ventilation, the simple precaution of opening them from the top about half an inch all around the room would prevent complaints of drafts and keep the air of the room in proper condition. When one person complains of the heat of a room, the average waiter will usually pull down windows for a foot or more, insuring immediate and justifiable complaints from others. If the windows were opened slightly from the top before meals, they would not be noticed and a rational adjustment of the matter would secure exemption from complaint.

Bath-Rooms. These need not be large, although they are more comfortable if roomy. *All bath-rooms and toilet-rooms should have windows to outer air.* Ventilating shafts are not so safe for health. The bath-rooms of the New Willard Hotel, at Washington, are 5 feet by 8 feet 2 inches. A marble wainscot four feet high is an admirable feature; the floor being finished in a sort of concrete with marble chippings, rubbed to a smooth hard finish, is an economical flooring and quite as good as one of mosaic made with cement and square marble cubes. The bath-tub in this hotel was 28 inches wide by 4 feet 9 inches long and 21 inches high above the floor, including the claw feet. An admirable feature of this bath-room was a small round stool, 13 inches in diameter, of wood stained to represent cherry, and 17½ inches high—very convenient for dressing.

The smallest bath room I ever saw was in the Hotel Cambridge, New York, being only 4 feet 7 inches wide by 6 feet 1 inch long, as per plan herewith. The bath-tub occupied the entire length, with the toilet and wash stand opposite each other, the door opening between them. This small bath-room, (see plan), which is a very comfortable one notwithstanding its size, is an evidence of what may be done in hotels, the owners of which claim that bath-rooms are impracticable for want of space. Bath-rooms have grown to be such necessities, to say nothing of comfort, in the estimation of the traveling public, that they should be provided and at a reasonable charge. The latest Astor Hotel in New York has four hundred bath rooms to six hundred bed-rooms. One bath-room to two bed-rooms is a better proportion.

An admirable arrangement of bath-room and closets is that of the Waldorf-Astoria, diagram herewith. This bath-room and the arrangement of the New Willard, with closets both sides, would commend themselves without elaboration.

Bath-rooms should be provided with small mirrors, 22 x 18. In the Royal Poinciana mirrors of this size are made of common pine painted with enamel white paint, with a small shelf and towel rack connected. They are a most convenient feature.

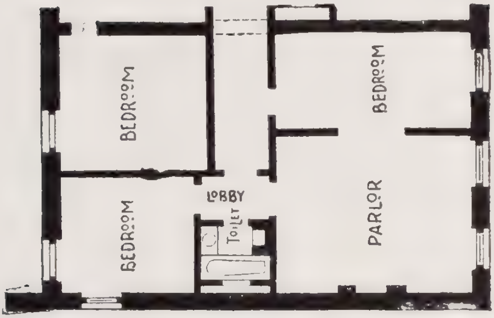


DIAGRAM OF THE CAMBRIDGE,
NEW YORK.

WALDORF-ASTORIA,
Fifth Avenue, New York.
Fourth Floor—Showing rooms and arrangement of bath-rooms and closets.

An important feature of a hotel bath-room which should never be omitted is a waterproof floor, of concrete or asphalt, so graded that in case the bath-tub overflows the water will run to an ordinary pipe, inch and a quarter in diameter, passing through the wall to the outside of the building and connecting with a metal leader or projecting sufficiently beyond the wall to prevent staining it. The leader should not connect with the drain or sewer on account of sewer gas. It can open on the ground, as it would seldom run water. Such a leader would save the wall from being stained. An elaborately frescoed ceiling in the dining-room of the Waldorf-Astoria, New York, was ruined in this way, and I have seen enough cases of injury to ceilings of hotels from this cause to enforce the wisdom and economy of this simple and inexpensive precaution. The waste and overflow pipe of the tub should be large enough to carry off water of both faucets, taking into account velocity of flow or pressure, not less than $1\frac{1}{4}$ inch in any case.

There should be a number of hooks in the bath-room, on the back of the door and at other points, as a convenience for hanging clothes, towels, etc. The best towel rack is a nickel-plated rod.

All bath and toilet rooms should have *outside windows* with stained or ground glass. They need not be large.

Water Closets. In ordering these specify the pattern by name, as manufacturers do not put their name on "seconds," cracked or imperfect closets.

Closets. These should be liberal in size, lighted if possible by an electric light, which can be arranged to shut or switch off by closing of door, and with shelves five feet above the floor, and hooks below the shelves. It is always a wise economy to take enough space from the bed rooms to give liberal closets.

Windows. A storm-proof window, especially for northern exposures, is made by having the sash grooved to fit a tongue in the frame. The Waldorf-Astoria windows are built in this way. In some cases the tongue is on the sill

and the groove in the bottom of the window sash; but a tongue and groove around the entire window is better still and makes a noiseless and storm-proof window. If windows are not grooved, anti-rattling catches should be provided. *Window chains are cheaper than cords.*

Windows should have low sills and large panes; and a better wall space for arranging furniture is secured by putting two windows close together, instead of separating them by a pier or wall space.

Avoid French windows, *i. e.*, the kind that open like doors. They are always inconvenient.

All windows should be provided with double curtains or shades, one of green and the other of brown holland, and they should always be provided with outside blinds. If fly or mosquito screens are needed they should be of "cop bronze," which is rustless. The outside blinds should be of one piece, and not double, for convenience and economy. They should be kept in good order and should not be stuck together with paint. Painters are usually careless on this point, resulting in the slats being broken in attempts to open them.

Outside blinds, however, are not convenient in cities and are liable to be neglected and torn off by wind, and inside or Venetian shutters are more convenient.

Doors. Double doors to communications between bedrooms *en suite* are especially important, particularly in the case of bath-rooms. The locks should not be opposite each other where double doors are provided. The panels should not be less than $\frac{7}{8}$ inch thick. Double doors are necessary to prevent annoyance from loud talking and to exclude the odors of tobacco smoke. Keyless double bolt locks to doors should be provided.

Electric Wiring. This should be in accordance with the rules of the National Board of Fire Underwriters, which may be procured from any of the local insurance men.

Chandeliers should not hang within 6 feet 4 inches of the floor. An economical lighting of rooms where electricity is available may be secured by clusters of three light

bulbs in the middle of the ceiling. This saves the cost of a chandelier and gives a better diffused light. In the ladies' writing room of the Royal Poinciana, at Palm Beach, three clusters of five bulbs each, light the room admirably, and it is a large one.

Slop Closets. These should have an outer window, and should not be in communication with toilet rooms. In some cases they are incorporated with the toilet rooms, with partitions not running to the ceiling, which is decidedly objectionable. They should not be receptacles for waste paper and rubbish, which should, in all cases, be carried immediately out of the building, where its burning would not endanger the structure. Slop closets should not be under staircases or near elevators, for the reason that they are too often receptacles for waste paper, rubbish, oily waste and other fire breeders. All sweepings are dangerous. A fire occurred under the main stairway of a hotel in which the writer was a guest, caused by a cigarette thrown carelessly through the door, which ignited the waste paper kept in a barrel. Slop closets should have sash doors, with ground wire glass, so that any fire starting in them would be detected quickly; and they should be kept locked. They should be of large and convenient size, and they should contain receptacles for soiled sheets and linen.

Transoms. These should be one foot high and of dark green glass, or else covered with green holland, to keep the light of the halls from illuminating bed-rooms, to the annoyance of guests, and hinged on the lower side so as to open upward and prevent direct drafts over the beds. If the doors were metal covered and the transoms "wire glass" the conditions would be ideal.

Music Room, Ball Room, with Stage, &c. This should be outside the main building, or underneath rooms allowed for bachelors or others who do not object to noise. In the case of the Royal Palm, at Miami, Florida, this room is outside of the main structure. Unless the music room is separated from the main structure, there should be rigid rules as to playing pianos after 11 o'clock P. M.

Smoking Room. To some persons tobacco smoke is poison. To all who do not smoke it is disagreeable; and even to those who do, too much smoke, especially a mixture of bad cigars with good ones, is anything but comfortable. At any rate, there is no reason why even a minority should not be considered by having a proper amount of space in the reading rooms, parlors and piazzas reserved for their comfort. In most hotels they are utterly ignored. The smoking-room should be ventilated by a 3-foot pipe carried to the roof. This would keep the room comfortable for those who smoke as well as for those who do not. In too many cases the smoking-room is so arranged that the smoke goes through all of the bed-rooms by natural drafts through the halls.

Boot and Shoe Boxes. A convenient feature of the Waldorf-Astoria, which I have not seen elsewhere, is a box in which shoes are left at night, to be cleaned and blacked. It is arranged in the closet and opens on the hall, with a door having a pane of glass, through which the porter can see shoes left for cleaning, unlocking it from the hallway. The halls are thus kept clear of the slovenly appearance of various kinds of footwear left in plain sight through a large portion of the evening.

Writing Desks. These should be provided in rooms. They may be made cheaply of stained wood or cherry, or white pine painted with white enamel paint. They should be substantial, not shaky. They are a great convenience, and save money in the labor of carrying ink, pens, &c., to the rooms, and, moreover, save staining of table-cloths and carpets, inevitable where they are not provided and where ink is carried to rooms. In the writing room, separate desks should be provided, as well as one large writing table. Most people object to sitting near other persons while writing letters.

Steam Risers. These if incorporated in the wall should be protected with non-conducting material to prevent their heating intermediate rooms through which they pass, whose occupants may not want the steam turned on. There should be a separate line of risers for different floors.

Piazzas. These usually spoil the bed-rooms nearest them, because of the noise and conversations carried on by those guests who stay up late at night. An admirable arrangement at the Hotel Royal Palm, at Miami, Fla., (see plan herewith), is to have them arranged about twenty feet from the main building, with a roof protecting them, the space between the piazzas and the main building, containing bed-rooms, &c., being utilized for shrubs, palms, etc. Where they are next to dining-rooms there is not so much objection, but they darken a dining-room, and even in such case it is better to have them separate.

One end of a piazza should be reserved where smoking is not allowed.

The balusters can be protected from having the paint worn off if a foot rest of 2 inch galvanized iron pipe is arranged in front of them. Otherwise they will soon become disfigured and unsightly. This pipe is a feature of the Royal Poinciana and Breakers Hotels, at Palm Beach.

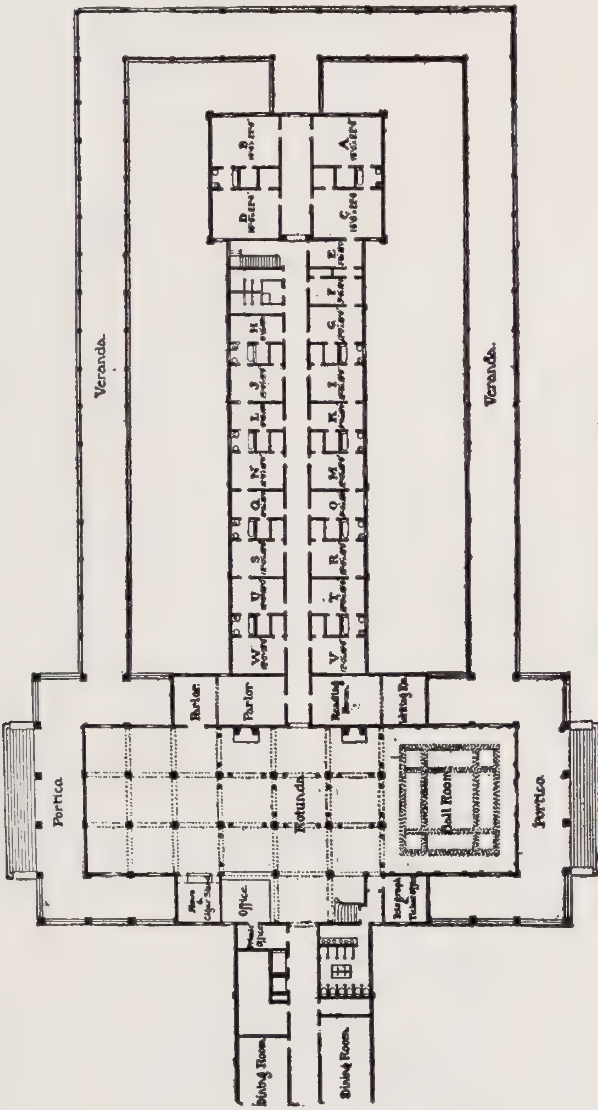
Boiler Room. It is important that this should be kept clean. Under no circumstances should fuel, especially bituminous coal, be piled against the brickwork of the boiler, and all kindling material should be kept a safe distance from the furnace mouth.

Baggage Room. This should have rubber floor, unless arranged under the office, where the noise of moving baggage would not disturb sleepers.

FIREPROOF HOTELS.

These, of course, are not to be found, as a rule, outside of large cities. The building law of New York requires that all hotels over 35 feet, or three stories in height, should be fireproof, and the law should be universal. The construction should be that recommended on pages 106–111. More explicit directions as to fireproof construction, have been published by me in pamphlet form.

At this point I wish to emphasize that in no class of hazards is it more important to avoid stone treads of



HOTEL ROYAL PALM,
Miami, Biscayne Bay, Florida.
Showing arrangement of Verandas, Ball-Room, Etc.

marble or slate for staircases, unless beneath the stone is an iron support, which will insure a good footing after the stone has disintegrated, as already explained on page 91.

Fire-Resisting Floors. The best floor is one of iron beams, spaced not over five feet on centres, with brick segmental arches. Next to brick for such segmental arches in reliability is burnt clay or terra cotta.

It is my opinion—but there are many who entertain a different one—that the old-fashioned brick segmental arch is the most reliable for resisting fire; that next to this in safety stands the porous, terra cotta arch, with end construction, *i. e.*, the blocks or separate pieces placed end to end between the beams, instead of side by side in what is known as "side construction." This is said to be stronger than side construction. It is claimed by many experts that porous terra cotta is a better non-conductor than brick on account of its interior air spaces. The arch should not be less than four inches thick at the crown, having a rise of at least $1\frac{1}{4}$ inches to each foot of span between the beams, and there should be a covering of good Portland cement and gravel concrete over this to ensure a waterproof floor. Cinder filling will burn—crushed slag from blast furnaces is better, but the Portland cement concrete should not be omitted for waterproofing purposes. Concrete arches, however, while not equal to brick, terra cotta or burnt clay arches, are economical floors, and are practically safe enough for the bed-room floors of hotels.

There are many patent floor arches for filling between I-beams which have great merit when properly put in, but I doubt if any of them is equal to brick or burnt clay, and it should always be borne in mind that when employed they should be constructed with the same care with which they are prepared for tests. This is almost equally true, however, as regards brick and burnt clay arches. There is less likelihood of poor installation work, however, with arches of brick or porous terra cotta or burnt clay. Arches should be laid in cement, not lime mortar. They should not be laid in freezing weather, and

where concrete is used the broken stone or gravel should be carefully washed and the cement should be of the best quality. Some of the better qualities of patent floors are the following: Fawcett, Guastavino, Rapp (which should be segmental arch form—not flat), Columbian, Metropolitan, Roebling, Manhattan or Expanded Metal, etc. These floors are fully illustrated in most of the text books on construction. In all of them, I repeat, the spacing of beams should not exceed five feet.

If the building is to be throughout of fireproof construction, the roof to conform should be constructed of brick or tile, the roof beams being of iron and, where tanks are supported, of sufficient strength to carry many times the actual probable weight of the water and the containing tank itself. If possible the roof tank should start on a corner of a brick building or straddle a party wall.

Slate roofs, on very high buildings, especially on street fronts, are objectionable as, in case of fire, the slates crack and, falling to the street, injure the firemen. A flat roof of brick-tile is better than any other. All slate should be laid in elastic cement.

All water on roofs from rain or melting snow should be drained from the front or sides to leaders, so as to avoid drip points, from which icicles could form. Too little attention is paid to the great danger of injury to pedestrians from falling snow or icicles on high buildings. This may not be a suggestion strictly germane to this article, but it is a matter so often overlooked as to warrant its being referred to in a treatise intended to deal more or less thoroughly with the subject of fireproof buildings.

CAUSES OF FIRES IN HOTELS.

The numerous fires in hotels are caused, in many cases, by drunken guests, who are careless with cigarettes, cigars, matches, &c., especially in toilet rooms, where loose paper either on floor or in wooden boxes on the floor should not be allowed. 25 cents per $100 extra should be charged for this fault in the insurance rate.

By rubbish in cellars, at the foot of elevator shafts, *under piazzas which are raised from the ground, often with open lattice work, or under platforms near the entrances, with open finish, through the open cracks of which lighted cigarettes or cigars find easy lodgment, to ignite rubbish below—a common fault.*

By matches kept in drawers of bureaus, ignited by opening and closing of drawers and breaking out into fire long after careless persons have left the room. Only "safety" matches, igniting on specially prepared surfaces, should be used in hotels.

Steam Pipes, put in insecurely and not arranged with guards to keep them away from woodwork.

Electric-light Wiring. Not properly installed.

By incendiaries, who find many opportunities of setting fire to rooms for purposes of robbery.

By carelessness of women using curling irons.

Lace and muslin curtains blowing into fireplaces or gas-lights—a frequent cause of fires, especially in bed-rooms. Curtains are liable to be ignited by careless guests using matches.

As I write a fire occurs in the Herald Square Hotel in New York in this way.

A fire in the Hotel Imperial of New York, October, 1902, caused by curtains blown into an alcohol lamp for heating curling irons, emphasizes both causes. Fortunately the building is fireproof and the damage was only $500.

By spontaneous combustion in waste closets.

By fires starting in repair rooms where old furniture is mended, glued, upholstered, &c. In one of the largest frame hotels in California I found the room for repairing old furniture on the top floor of the building where its burning would have involved the whole property.

In oil and lamp rooms, which should always be outside of the main structure. No gasolene should be used about a hotel!

By swinging gas-brackets swinging against woodwork or curtains.

Open fireplaces unprovided with wire netting fenders covering the opening—very important!

Sawdust Spittoons. These are prolific causes of fires from cast off cigarettes or cigar stumps. They should not be allowed in hotels, and are often found in bar-rooms and toilet-rooms.

Kitchen Fires. These occur from bake ovens, boiling over of fat used for frying doughnuts, &c., &c., or from piling firewood near the ovens or ranges.

"A hotel man tells the following in regard to hotel fires: Whenever you hear of a hotel fire whose origin is a mystery, it is safe to attribute it to the cause I will give. The best cooking lard is the fat that is fried out of the fat part of beef. In restaurants and hotels it is put into a caldron during the day and set on the range over night. A light fire is usually kept in the range to save the trouble of starting it in the morning. During the night it may happen that an unusual draught is created by a high wind. The fire blazes up, the caldron begins to boil and the fat is in the flame. Next it is in the pot, and then follows an explosion, scattering the blazing grease in every direction. Result—a fire of mysterious origin, which destroys the building and all of its contents."—*From the Boston Advertiser.*

FIRE APPLIANCES.

Every hotel should have a standpipe not less than three inches in diameter, (four inch pipe is better), with outlets for hose every hundred feet and if possible near a staircase, so that the hose can be used until the last moment. There should be fifty feet of hose at each outlet, and the valve should be a lever valve, opening by pulling it from the wall, so that it can be pulled only in one direction. Few persons understand handling a wheel valve, especially in the excitement attending a fire. Automatic hose-reels which open the valve when the hose is unwound are best.

Fire pails, painted red, with round bottoms, arranged on a shelf with holes to fit the round bottoms (which insures their not being carried off to use for other purposes), should be provided at the rate of six filled pails for every 50 running feet of hallway. They are admirable fire-extinguishing appliances, superior to all others, because anyone knows how to use them.

Axes and crowbars should be provided every hundred feet.

In fire department towns there should be a special building signal with alarm boxes in halls on each floor connected with the nearest street box of the city fire department, to insure prompt arrival of firemen. A liberal supply of fire escapes should be provided and the ladders leading from those on the exterior of the building should be between windows and not opposite them. This precaution is generally overlooked and a fire on any floor is apt to interfere with passing down the fire escapes. Fire gongs, which may be sounded from the office, should be in the halls on each floor, or better still in each room, to arouse guests in case of danger.

Watch-clocks, insuring careful work of watchmen, with stations at proper points, to ensure thorough supervision, are necessary; and large alarm bells, capable of being rung from the office as well as from each floor, should be arranged for wakening guests.

Candles and candlesticks should be provided in all rooms. As already stated, electric lights and gas are usually extinguished at an early stage of a fire.

As already suggested, lamps should be provided in the halls, on shelves at least seven feet from the floor. Those located near staircases and elevators with red shades.

PREVENTION VS. EXTINCTION.

All fire appliances, however, no matter how thorough, important as they are, are of little value as compared with the prevention of fire. In no other class of risks can it be more truly said that an ounce of prevention is worth a pound of cure. All dangerous processes which tend to start fires, therefore, should be outside of the building. The kitchen, the bake ovens, the laundry, the waste rooms, the paint and oil rooms, the lamp-filling rooms, furniture repair and upholstering rooms, carpenter shop, &c., &c., should never be allowed where their ignition would endanger the main structure.

An average of over three hotels a day destroyed by fire during the year just closed, throughout the United States, is a fearful record of criminal indifference to proper construction, fully justifying the admonitions of this treatise.

Hot Houses. (See Green Houses.)

Houses of Refuge. Reform Schools, Etc. Decline. The moral hazard connected with unruly and vicious inmates is one that cannot be measured by obtainable rates.

Hub and Spoke Factories. Refer to company with full particulars.

Ice Houses. These are not insurable unless so located as to be surely filled every year and winters can be relied upon. Where the water is pure and not in danger of contamination and near a good market, companies may regard them favorably at high rates, but should be advised with before binding. It should be remembered that ice will not bear high freight charges. The question of forest or grass fire exposure is important.

Ice, Artificial, Manufactories. These are not desirable when in competition with a sure supply of natural ice. Where natural ice cannot be obtained they may be good risks at proper rates, if the boiler hazard is properly guarded. Refer to company with full explanation of the process and careful inspection and report.

Incubators. Decline.

India Rubber Manufactories. These have not been profitable to companies. Owing to the use of benzine, as a solvent, fires are frequent and rapid. Decline them for this company. The use of alcohol and linseed oil in the manufacture of rubber cloth may be productive of fires in this class of risks. Bisulphide of carbon used is volatile and liable to explosion. Great care is necessary with it.

A fire occurred in the Goodyear India Rubber Glove factory at Naugatuck, Conn., December 26th, 1872, caused by an explosion from electricity, to which these risks are peculiarly liable. A workman was engaged, at the time, in hanging rubber cloths in the steam vulcanizing chamber attached to the works. "Suddenly, without any warning, the fire streamed from his hands to the cloth, an explosion followed and, in a moment, the building was in flames. This cloth is treated with linseed oil and alcohol, and it is the theory of the superintendent that the vapor of the alcohol was ignited by the electric fire." Soft rubber factories use large amounts of benzine or naphtha cement, and rubber boot and shoe factories use cement, also, in large quan-

tities, together with varnish thinned with benzine or naphtha. This hazard should be separated from the main building. Pails-full of sand should be liberally provided in rooms where cement is used. Gossamer rubber factories have the hazard of spreading liquid rubber on cloth, the rubber being thinned with benzine or naphtha. The process necessitates the presence of a large amount of liquid rubber in the room and carries with it the hazard of spreading by machinery. The room where this process is carried on should be thoroughly ventilated, to carry off the fumes, and the machine should be equipped to carry off electricity and so avoid the danger of electric sparks. Very few companies write these risks and only at high rates, and the company should be conferred with before binding.

There is less danger in hard rubber manufactories than in soft rubber, on account of the difference in process.

Ink Manufactories. Advise company as to oil boiling and safety of appliances for use of fire. These risks should pay full rates. Those making writing ink are less hazardous than those making printing inks. The latter carry with them the hazard of oil boiling and mixing lamp-black, colors and linseed oil by steam power—practically a paint mill hazard.

Insane Asylums. (See Asylums.)

Instrument Makers. The stock, especially in process of manufacture, is exceedingly delicate and liable to damage by water. They should pay full rates. The physical hazards are simply those of metal workers.

Iron Foundries. (See Foundries.)

Iron Furnaces. (See Furnaces.)

Iron Pipe Manufactories. (See Pipe.)

Jails. These risks as usually constructed are uninsurable except at full rates, and they are bad exposures to court houses, being sometimes intentionally set on fire by outside friends of prisoners in the hope that the excitement attending the fire and the removal of prisoners may offer facilities for escape or rescue.

Japanning Works. (See page 411.)

Jewelry Manufactories. These are good risks at fair rates. The physical hazards will be readily seen on inspection, and should be reported upon.

Junk and Rag Stores. Decline. Aside from the unsatisfactory character of the stock for the purpose of adjusting losses, they contain heterogeneous accumulations of inflammable and combustible materials, liable to spontaneous ignition, &c., and there is no money in the class at current rates.

Jute Factories. These require the most careful examination and rates should be full, and the risks should not be made binding without the consent of the company first obtained. The processes are dangerous and more or less dirty, and raw jute is particularly subject to spontaneous ignition. Fires are rapid and usually mean total losses. They should be thoroughly sprinkled.

Kerosene Refineries. Do not bind without consent of company first obtained. They are, of course, especially dangerous.

Kilns. These are undesirable as separate risks and they are not favorably regarded even in connection with breweries, woodworkers and other risks of which they are an incident. Where any woodwork enters into the framing of the kiln, whether claimed to be safely protected by brick or terra cotta or not, it is safe to decline them. (See Dry-Rooms, page 409.)

Kindling Wood Factories. Decline. Few companies write them, and only at very high rates. Buildings are usually of cheap construction and the hazard is a dangerous one. In modern risks the drying hazard is a serious one, and I have already emphasized the almost uninsurable nature of a wood dry-room process.

Knitting Mills. These have not been profitable at current rates and companies do not write them unless exceptionally well constructed and managed. They should be inspected according to the rules of Cotton and Woolen Mills, which see page 446.

Ladder Manufactories. Those manufacturing step ladders involve soft wood processes and should pay about 50% more than rung ladder manufactories. They should pay same rates as carpenter shops.

Laboratories, Chemical. Same rates as Chemical Works, which see page 441.

Lamp-Black Manufactories. Few companies write these, and they should be consulted before binding. The process is a dan-

gerous one and buildings are usually of cheap construction, built with the expectation of frequent fires. The material itself is liable to spontaneous ignition and should be stored where it will be kept dry.

Lamp Manufactories. These involve the hazards of Glass and Metal Working and should be inspected and reported on according to these hazards.

Lard Oil Refineries. As a class these are undesirable. They should not be bound without consent of the company first obtained and full report as to the use of fire, heat, boiling, etc., etc.

Lath and Shingle Mills. These have always been undesirable risks. They are cheap offshoots of planing and saw mills and the large quantities of small-dimensioned wood, excess of shavings and chronic carelessness have made them unprofitable.

Laundries. These have not been profitable risks and fires are almost certain to occur in the drying portion if it is not fireproof as it should always be. Too often the clothes are dried on racks which are shoved into wooden frames containing steam pipes, and a garment falling on the pipes, or dust collecting, is almost certain to result in fire. Floors should be concrete and wire netting above steam pipes provided to prevent clothes from falling on them. Advise company fully on these important points.

Lead Manufactories. Lead pipe, sheet lead, etc. This involves, of course, the furnace hazard, which should be carefully inspected and reported upon; also the handling of hot metal in large quantities.

Licorice Manufactories. These involve the physical hazards of grinding, boiling, &c., which can be measured by any intelligent agent. The dust hazard connected with the grinding should not be ignored (see Flour Mills.) A stock of licorice root it is claimed is very susceptible to damage, and it is said to become easily impregnated with smoke and water and made unfit for use; special attention is drawn to this fact by the recent fire in the MacAndrews & Forbes establishment in Camden, N. J. Lines upon it should not be taken at rates less than 3%, even with good buildings which under proper schedules would rate not over 1%. *Be careful to insure the stock of licorice root under a specific amount and rate.*

Linoleum Manufactories. (See Oil Cloth, page 521.)

Linseed Oil Mills. Refer to company with full advices as to the particular process of manufacture.

Lithographing Establishments. An unprofitable class. In some cases carelessly managed as to greasy rags, rubbish, refuse, etc. The stock is peculiarly subject to damage and excessive claims from water or smoke. The stones should never be insured beyond their value as stones, as the drawings on them may be utterly worthless after they have been once used for printing an edition. The presses are heavy and they are frequently upstairs where fires get under headway before being discovered and where firemen cannot reach them. Do not bind without consent of company first obtained on full advice.

Livery Stables. Small lines at full rates may be written, with a specific and proper amount on horses and a limit of claim on any one in case of loss. The class is often insured for a small percentage of the value, with some such clause as, "on 10 horses, not exceeding $150 on any one horse." This might mean any ten of 100 horses, the owner counting on being fully covered with insurance on ten with the expectation of not having more than that number in the building at the time of the fire.

Such phraseology as "$500 on five horses" would not prevent a claim of $500 on any one, even though there were twenty. Nor would the additional words "not exceeding $100 on any one" mend the matter, except to prevent claim for more than that amount on any one. The policy would still be faulty in that it might be covering a much larger number of animals than five and a larger value than $500. In case any five animals should be killed by lightning or burned, the claim would be that the identical five were the ones insured. (See page 302.)

High priced animals, blooded stallions, jacks, race horses, brood mares, etc., should not be insured without the consent of company.

The concentrated value within the space of a horse stall, of an exceptionally valuable animal, subject to total loss by the effect of fire or smoke on a single vital organ, the suffocation of a single pair of lungs, for example, is a feature which should not be lost sight of in the rate. Five thousand dollars insurance on 50 animals where the loss of any one could not exceeed $100 is

a much better risk with respect to probabilities of salvage than $5,000 insurance on a single horse.

With a certain class of owners, also, a serious moral hazard may arise from a slight injury to a valuable animal reducing its salable value possibly 90%.

In the case of breeding, racing and training stables, the stable rules should prohibit the use of matches, kerosene oil lanterns, &c., &c. Probably the most fruitful causes of fires in stables are dropped matches, the animals igniting them with their feet.

Animals above or below the grade floor should be charged for at the rate of 10 cents added for each floor above or below the grade.

City stables are sometimes three and four stories high and horses stalled on these upper floors are nearly always suffocated by the ascending smoke. It is unnecessary to suggest, also, that sleighs on upper floors, or carriages, should pay higher rates than where they are on the grade floor, where they can be saved, although the rates are usually based on the supposition of such favorable salvage conditions. Specific amounts should be insured on horses, on rolling stock, with a limit on any one vehicle, on hay and feed, and on harness. The last two items seldom show any salvage and for this reason ought to be specifically insured. Where horses are brought home late at night fires sometimes result from careless use of lights by sleepy or intoxicated hostlers. Automatic sprinklers would be admirable fire extinguishing appliances for stables with a sprinkler head over each stall. In such cases a fire caused by the ignition of a stray match under the foot of a horse would be extinguished before it could spread beyond the stall in which it started.

Live Stock, Horses, Cattle, Sheep, Hogs. If the policy contains the following clause, the company may authorize a reduction in rate on the amount covering live stock:

"The amount payable on any one animal in case of loss shall not exceed the sum produced by dividing the total amount insured upon the class to which the animal belongs by the total number of animals in the class owned by the assured, not exceeding $............on any one, and in no case exceeding the actual cash value of the animal."

For example, $1,000 insured on horses would mean that $100 could be collected on any one if there were ten (and the one lost were worth $100); $200 on any one if there were five, and the one lost were worth $200.

No rate on live stock, especially on such animals as cattle, sheep, &c., running at large in fields, could be relied upon without some such clause as the above; nor would the number of animals on the farm at the time of writing the insurance be any guarantee that the number at risk would not have been largely increased at the time of a fire. A small amount of insurance on a large herd of cattle would entail severe loss to the underwriter in the course of a five-year term from lightning claims alone, especially in a wire fence country.

Lock Factories. Inspect as to boiler-rooms, dry-rooms, japanning, forging, foundry work, etc., etc.

Locomotive Works. These may involve, in addition to machine shop hazards, foundry work woodwork, sawing, planing, varnishing, turning, etc. Inspect carefully and advise fully.

Looking Glass and Mirror Plate Manufactories. These should pay full rates. The stock is very susceptible to damage, both manufactured and in process.

Lumber Yards. Those yards where lumber is piled high are poorer risks than where the piles are low, fires being difficult to extinguish when the piles are unusually high, and an additional charge of twenty-five cents should be made in the rate if piles are over ten feet high. Hardwood yards may, also, be insured at lower rates than soft lumber. A difference may be made in favor of "timber yards" where none of the timber is less than 3 x 5 in size. In such yards the piles are, usually, low and the timber is piled solid, without stripping. It is also seldom thoroughly dry and, therefore, does not ignite easily.

In case of a fire in a lumber yard, boards should be stood upon end against the piles to be protected, on the side towards the fire, with "broken" or "lap" joints and kept wet with the aid of the engines. This will prevent the entrance of fire into the spaces between the lumber. Lumber being generally piled with small strips between the courses of boards, to admit of a circulation of air for purposes of drying and seasoning, a fire is difficult to extinguish when it once gains access to the interior of a high pile.

Lumber yards may be so exposed by planing or saw mills as to call for mill rates. Where the owner agrees that a clear space shall be maintained between the lumber and such an exposure, to obtain a concession in rate, a warranty should be written in the policy, as per following National Board Standard Form No. 9:

"It is a condition of this contract that a continuous clear space of.....feet shall be maintained between the property hereby insured and any woodworking establishment or dry kiln, otherwise this policy shall be void; this does not prohibit the transportation of lumber or timber products across such clear space."

If exposed by steam saw, planing, or shingle mill, a clear space of, at least, 150 feet should be maintained to constitute an unexposed risk. Recent fires indicate that even this space is not sufficient.

Few classes of risks are so inadequately rated as lumber yards exposed by saw or planing mills. It is safe as a rule to say that such risks should pay the mill rates. The "mill yard" clause of the National Board (see Index) should be used.

The continuous lines of lumber yards, so frequently to be found along water fronts, are not desirable risks, and rates, and particularly *lines*, should be governed accordingly.

Lumber in yards divided by streets or alleys of the width of forty feet or more, must, in all cases, be insured specifically, or the average clause inserted. The average or co-insurance clause should be inserted in policies on lumber.

For a yard *well fenced*, a deduction in rate may be made.

Lunatic Asylums. (See Asylums.)

Macaroni Factories. Report as to cooking, fire appliances, drying arrangements, etc., etc.

Machine Shops. Refer to company with particulars, especially as to any woodwork done. In some machine shops the amount of woodworking is so considerable as to require special rating.

Carelessness in not properly disposing of oily cotton waste or rags used in wiping off machinery is observable in some establishments. Metal receptacles should be provided and regularly emptied every night. The iron filings, lathe chips, etc., will cause spontaneous ignition if permitted to accumulate and to become rusty from dampness. (See page 142.) The floors

should, therefore, be kept clean. In nut and bolt works, especially, if sawdust is used for cleaning, the danger is increased. (See Foundries, page 471.)

Not over 10% of the amount of insurance should cover on patterns, and it is important to see that those insured are live patterns and not those of out of date machinery, which may be no more valuable than so much kindling wood. Even honest owners sometimes attach a mistaken value to a useless pattern.

Malt Houses. Examine carefully as to kilns. It is safe to decline those whose kilns contain any wood in their construction.

Match Factories. These are dangerous risks but it may be possible to construct them so that by subdividing the hazards they may be insured at full rates, but it is not likely that any match factories at present in operation can be regarded as insurable. The cutting of the splints, their drying, the dipping process—from the initial process to the packing for sale, including the box making—every process is hazardous. It is well known that phosphorus deprived of the water in which it is necessary to submerge it, will take fire, but knowledge of this danger on the part of those using it suffices to make this serious hazard less prolific of loss than some of the processes like drying, dipping, etc., etc., as to which parties are not so apprehensive. Potassium chlorate is dangerous in combinations and would be especially so in connection with sulphur and other chemicals used in the process. Saltpetre is also used. Under no circumstances should the class be insured without the consent of the company first obtained. Adequate rates are not likely to be obtainable.

Mattress Making. Even the best of these risks should pay in the neighborhood of 3% and ought not to be insured without the consent of the company first obtained. The picker room should be completely isolated.

Menageries. Accepted by few companies. Valuable animals liable to be suffocated by smoke, carelessness of hands as to matches, etc., etc., tend to make the class undesirable. Obtain consent of company before binding.

Mining Property. This should not be insured without full report to the company and consent first obtained. Buildings are

generally of cheap construction, and the arrangement of the boiler and stack, which latter is generally of iron, should be carefully investigated and reported upon. The class of help employed usually involves a serious moral hazard. Often a moral hazard is involved through uncertainty of veins.

Morocco Factories. Advise company as to processes and hazards before binding. Building and machinery lines preferable to lines on stock. The stock, both raw and finished, is more susceptible to damage than that of ordinary leather workers, but the old process morocco factories are not more dangerous than any leather worker—in fact, not so bad as the ordinary currier shop, with its grease and oil hazards. Some morocco factories now operating under this name are really patent leather factories, as they have the hazard of varnishing and baking the leather, although not to the extent of a full-fledged patent leather factory. The rate should be high.

Moss Factories. These are cheap structures as a rule, and the processes exceedingly dangerous. We prefer to decline them.

Moulding Mills. Same as Planing Mills. They should rate about 25% higher than planing mills doing only tongueing, grooving and surfacing.

Museums. The contents of these risks are undesirable as a rule. The values are unsatisfactory as to claims in case of loss, and they often combine a serious cheap theatre hazard with scenery.

Nut and Bolt Works. (See Bolt and Nut Works, page 433.)

Oatmeal Mills. These have not been profitable risks. They have all the dangers of flour mills—grinding, dust explosion hazards, etc.—with the added hazards of kilns, which should be fireproof but seldom are. Do not bind without consent of company obtained after full advice.

It is claimed that the material should not be discharged directly from the shelling and grinding apparatus into the elevator, because the movement of its cups would create a current of air, but that they should pass immediately into a feeder, and that the dust of oatmeal mills is so much dryer than that of flour mills that a specially explosive hazard is involved.

Office Furniture and Fixtures. (See Fixtures, page 464.)

Oil Mills. (See Linseed, Cotton Seed and Lard Oil.)

Oil Cloth Manufactories. These have not been profitable to companies, notwithstanding the high rates paid on them. The processes are exceedingly dangerous, and I have never seen a risk which was properly divided. The chief hazard is the cutting of the cloth, the printing and the drying, which includes the hazards of painting and varnishing. There is more or less electric hazard at the machine, and the extensive drying processes involve conditions which mean rapid and serious fires, the cloth being festooned in large drying rooms. There are also the extensive mixing and grinding hazards by steam power equal to those of a paint-mill. This part of the work should be entirely separated from the other buildings.

Linoleum factories involve the grinding of cork and extensive use of linseed oil, and have practically the same printing hazard as an ordinary oilcloth factory.

Oil Clothing Manufactories. Some of these establishments are of large area; the hazard is involved in the coating of the cloth with linseed oil, extensive drying processess and the danger of spontaneous combustion peculiar to the materials used.

Oil Refineries. Decline.

Oil Warehouses and Oil Tanks—Petroleum or Kerosene. Few companies write these.

Opera Houses. (See Theatres.)

Organ and Piano Manufactories. Report fully as to the various processes—sawing, planing, cabinet work, gluing, drying, varnishing, etc., etc. They should pay full rates. The stock, whether in process of manufacture or finished, is very susceptible to damage by smoke, heat and water.

Organs in Churches. These should pay materially higher rates than the church structure itself—at least four times as much. As a rule they should be insured with the church and the amount on the organ divided in this way among all of the companies interested.

Packing Box Manufactories. (See Box Manufactories, page 434.)

Pail Manufactories. (See Bucket Manufactories, page 436.)

Paint Manufactories, including Color Manufactories. Inspect carefully and advise company fully as to use and storage of oils, etc., character of paint made, drying processes, furnaces where material is burned, and drying of the ground material in oils. Many of the establishments manufacturing cheap paints use benzine and naphtha for thinning. Very high rates are necessary and few companies write them.

Panoramas. Cycloramas, Cinemetographs, Etc. Decline. The latter are very liable to fires from ignited celluloid films. Extravagant claims are often made on large paintings where only a small surface is injured by fire or smoke. Buildings are unsuited for any other use and are undesirable.

Paper Box Manufactories. (See Box Manufactories, page 434.)

Paper Hanging Manufactories. (See Wall Paper.)

Paper Mills. Refer to company with full survey. These risks would be much improved if the different processes were separated by fire walls and iron doors; the sliding, self-closing doors recommended on page 371 being the most desirable for the purpose. Such a division would, clearly, be more in the interest of the owner than of the company, as he could then insure the values of non-hazardous portions of his risk for specific amounts and at lower rates than are now charged for the whole, thus securing the advantage of a saving in the matter of rate, but a still greater advantage in the fact that his entire property could not be destroyed, and his business brought to a stand-still, by a single, untoward accident.

In a mill so divided, the dusting and cutting of rags by machinery might be easily and at small cost isolated. The storing of rags, more particularly of the lower grades, and the sorting of them—unless thoroughly dusted before going into the hands of the sorters—should be cut off by a fire wall with standard doors. The sizing, also, should not be prepared (unless heated by steam) where it will endanger the mill. The process of making paper, after the rags or stock are in the bleach, is not a dangerous one; and where the drying of the paper is safely managed—it is generally dried by steam-pipes in the attic, which should be thoroughly examined to see that steam-pipes are, at no point, in contact with wood, and *that*

neither lights nor smoking are permitted—a lower rate might be charged than is due to the more dangerous processes.

The use of cotton waste should render a risk uninsurable. (See "Cotton and Woolen Mill Fires.")

Examine as to the storage and handling of lime.

Straw Paper Mills and Manilla Mills, as usually managed, are not desirable risks at current and obtainable rates.

The stacks of straw should be, at least, 150 feet from the mill and only the straw required for each day's work should be permitted in or near the mill. The cutting of old rope, etc., should be separated from the mill, as before recommended.

Fire Appliances.—These should be complete, as recommended for special hazards, pp. 420–421. Steam jets are, probably, the most effective of all fire appliances for paper mills, and should be provided in each room, particularly in the dusting, cutting and drying rooms. A steam jet in each dusting machine would be a desirable precaution, in view of the fires caused by matches or foreign substances passing through the machines.

Paper mills to be standard risks should not be over three stories high.

Patent Leather Manufactories. The hazard of removing the fats and greases from the leather by immersing hides in naphtha baths is an especially dangerous one and needs to be carefully isolated. The drying process and the arrangement of ovens need careful inspection, especially as to the arrangement of steam-pipes. The composition or mixture which produces the patent finish on the leather is liable to ignition, and some suppose to spontaneous ignition. The storage of lamp-black should be safely arranged. The whole process is one favoring quick ignition and intense combustion. The class has not been profitable, although high rates of premiums have been charged. They should not be insured without the consent of the company first obtained on full report.

Patent Medicine Manufactories. Report fully as to processes, heat used, chemicals stored, etc., etc. Some of them have all the hazards of chemical works.

Patterns. Wooden patterns, as already explained, for machines no longer in demand, are utterly valueless. Moreover,

a slight injury to any part of a pattern is sometimes claimed to necessitate an entirely new pattern. They are undesirable and they should only be insured as a certain percentage of insurance on foundry or other risk using them.

Pawnbrokers. The following form of policy should be used, full rates obtained, and moral hazard carefully investigated:

$............On the Right and Interest of the assured in the articles and stock of merchandise, (merchandise in fireproof safes excepted) held in trust or in pledge by said assured as pawnbrokers including interest accrued thereon as allowed by law

$............On the Right and Interest of the assured in the articles and stock of merchandise, in fireproof safes only, held in trust or in pledge by said assured as pawnbrokers, including interest accrued thereon as allowed by law

$...... ... ...On merchandise, the property solely of said assured, all contained in the.......... ..building, while occupied as .... situate ... .

This insurance does not protect the interest of parties whose goods are pledged to the assured, nor does it cover the excess of the amount loaned, with its lawful accrued interest, upon any article above the sound value of the same at the time of any fire.

Penitentiaries. Prisons and Prison Workshops. These are undesirable risks, especially on goods of contractors in process of manufacture. Shops are frequently burned by convicts compelled to work in them against their will, either out of spite or to secure excitement which would favor a break for liberty. Consult company before binding. High rates are necessary.

Phosphate Mills. These combine the hazards of acid making with Glover and Guy-Lussac towers, the use of saltpetre and its storage, the danger of spontaneous ignition of empty saltpetre bags in sunlight, the danger of spontaneous combustion in ammoniacal products of blood, etc., and should be carefully inspected and consent of company obtained before insuring

Photographers' Stocks. The policy should exclude negatives, dry plates and films. Insurance on these is usually worth five times the rate on the general stock, whereas negatives are frequently included in the policy covering the other property. It is a safe general rule to limit the loss on any one negative to a small nominal amount, say, ten or fifteen cents, and sometimes only to their value as glass.

Manufactories of dry plates and films are exceeding hazardous risks, the process requiring the use of explosive chemicals; and in making films there is the added hazard of the presence on the premises of large quantities of celluloid, which in case of fire is likely to result in quick and total destruction.

Piano Manufactories. (See Organ and Piano Manufactories.)

Picture Frame Manufactories. These are undesirable at current rates. Much woodworking is done and the stock is particularly susceptible to damage from water, fire and smoke. If moulding is made on premises, same rates as moulding mills.

Pie Bakeries. (See Bakeries.)

Pipe Manufactories—Burned Clay Drain and Sewer Pipe, etc. These have all the hazards of potteries and are usually of cheap frame shed construction, and are undesirable risks. High rates necessary.

Pipe Manufactories—Iron. These involve the hazards of rolling mills, wrought iron works, and of foundries for cast-iron. In cast-iron pipe manufactories there is added to the usual foundry hazard that of making hay rope, with which the wooden core is wound before being coated with clay, and this necessitates the carrying of large quantities of hay and straw and storing of it; the process should be entirely separated from the other buildings. They have also the hazard of tarring the pipe, which should be done outside.

Cold drawn tube factories carry the hazard of a large amount of mineral oil, making very greasy risks.

Planing Mills. These risks might be greatly improved. They are, as at present constructed, very liable to fire, and being generally filled with lumber, shavings and other combustible material—every beam, rafter and flat surface, where dust can find a resting place, being usually covered with a fine, combustible collection of material which ignites like tinder—they generally prove a total loss. The dust of a planing mill, like that of a tannery bark mill, will carry fire long after it is supposed to be extinguished. It is also very liable to ignite from a heated journal or from a spark of electricity from belts, and its collection in the quantities usual to some risks should be prevented, if possible, by avoiding the "shoulders" formed under eaves, and

by squared timbers which afford resting places for it. The mill should be so constructed that it may be easily kept clean, the walls and ceilings being regularly swept down.

Planing mills are frequently set on fire by what are known as "back draughts" at the furnaces, which are hazards inseparable from the use of shavings for fuel. On rainy days, when the fuel is damp, the smoke is dense and heavier than the atmosphere, for the double reason that, on such days, the atmosphere, itself, is lighter than in fair weather, and the lumber to be planed is wet, the shavings used for fuel being, therefore, more or less damp and heavy. The draught of the chimneys, on such days, is insufficient to carry off the smoke and is often reversed, throwing the entire contents of the furnaces into the fire room. For this reason, the boilers should either be outside of the mill and in a room not communicating with it, or—if in a communicating, fireproof room—so set that the *line of furnace feed may be either in an opposite direction from the communication with the mill, or at right angles to it*, and not directly in line with the door, as, in the latter case, the fire might be emptied into the mill itself (see diagram and explanation, pp. 309-311.) There should, properly, be no communication between the mill and the boiler room, which should be cut off by a good fire wall. The shavings vault, or fuel room, should, if in or under the mill, be fireproof, and so constructed, with iron coverings to all openings, that it can, in case of fire in it, be closed as nearly air-tight as possible. A steam jet in it would instantly extinguish fire. Under no circumstances ought it to have a flue or chimney to the outer air, as such a chimney would supply the oxygen and draught for combustion and prevent the possibility of smothering a fire. The door between the shavings vault or fuel room and the boiler room should, also, open at *right angles to the furnace feed*. A mill with the boilers inside and not in a fireproof room should be regarded as uninsurable.

Where boilers are underground, and where the space above them is used for piling lumber or for storing shavings, it is almost impossible to make them safe and best to decline the mill.

Where shavings are conveyed to the furnaces by chutes or conveyors, with blowers, the conveyors should be of metal and

never of wood, and they should empty into the shavings vault or fuel room and never into the *fire room*, and should be closed when not in use.

The shavings should be removed, as fast as made, by blowers, and if not so removed, should all be gathered into the vault at night, and the doors to the vault securely closed. If it is impossible to get all of them in, they should be swept up into a pile, the surface of which should be thoroughly wetted down with a hose. Loose shavings, scattered over the floor, or about the entrances of the mill, are more dangerous than those in piles. In case of a fire, it will seldom be found that a large pile of shavings is entirely burned up. As a rule, the surface only is burned off and the fire goes out for want of air. The rule of the mill, therefore, should be to have all shavings swept up at night, and the hose well played over the pile and around the doorways, to prevent danger from castaway cigars or matches of passers-by or from the intentional acts of malicious persons.

Most of the machinery of a planing mill—the cylinders of planing machines, tongueing and grooving cutter-heads, circular saws, etc., run at great speed, and journals of the best and hardest metal are frequently melted by friction. The boys or other low-priced hands employed, in some mills, to tend small circular saws, seldom think of examining the bearings of mandrels to see if they are thoroughly cool before going home, and, for this reason, some reliable person should make it his duty to regularly examine all journals after shutting down for the day.

The watchman should commence his watch as soon as the hands leave, and should be provided with a closed proper lantern. (See page 421.)

A planing mill might be so constructed as to be insured at four per cent. with more profit to underwriters than, as generally constructed, at eight per cent.

A mill built upon the following plan might be regarded as a standard risk:

STANDARD PLANING MILL.

Building. Brick or stone walls, 18 inches thick, not over 5000 square feet of area (say 50 x 100,) one story high, roof of metal

or slate, or shingles laid in mortar, and floor of earth, brick or stone or heavy two-inch (or three-inch) plank, *laid upon the earth, without any intermediate space.* Such a floor is both safe and economical. The main building should be used for planing and sawing purposes only—the dry-room, boiler room, sash and blind making and painting should be in separate, fireproof divisions, not endangering the mill. The shavings vault or fuel room should be so constructed as not to expose the mill, and with a steam jet (valve outside), and the shavings to be removed from the machines to the fuel room, as fast as made, by blowers and metallic conductors.

Heating. None except in office.

Lighting. Mill to run by daylight only.

Boiler Room. To be fireproof and not endangering the mill. Earth, brick or stone floor and fireproof roof. Fireman to have no other duties than attending to the boiler, and the boilers to be so arranged that nothing combustible can be piled or deposited over them, as recommended on page 405.

Boiler Chimney. Of brick, double walls (see page 406), to be not less than twenty feet higher than surrounding roofs, *and with a spark arrester.*

Fire Appliances. Force pump with sufficient $2\frac{1}{2}$-inch hose attached to reach all parts of the mill. Steam jets to each room, including the shavings vault and dry-room—valves to be outside of the room in each case. Sprinklers in main mill, and casks of water and pails to each room.

Watchman with Watch-Clock or Watch and using a covered light, burning a safe oil.

Regulations. Mill to be cleaned up every night, all the shavings to be gathered into the fuel-room and the mill to be well wet down, especially about the doorways. The mill to be securely closed so that nothing can be thrown in from outside.

Charge for deficiencies from such a standard, as follows:

BASIS RATE	$4.00
IF FRAME WALLS, add	1.00
Note.—This charge does not include that for shingle roof.	
HEIGHT. Each story over one (if over two, decline)	.50
AREA. Each 1000 square feet, or fraction thereof, over standard	.25

ROOF. Composition 25 cents, shingle .... .50
ACCESS TO ROOF. If over one story and no scuttle ...... .25
LADDERS. None .... .10
FLOOR. Not according to standard .... .50
HEATING. Not permitted outside office.
WATCHMAN. If none .... .50
If watchman but no watch clock .... .25
BOILER ROOM. Fireproof, but communicating WITH MILL by door, opening in an *opposite direction from furnace feed or at right angles to it*—with iron door. .50
If without iron door 1.00
If communicating by door opening in *direct line of furnace feed*, with iron door 1.00
If without iron door—*uninsurable.*
Communicating with FUEL ROOM by door *opening at right angles to furnace feed or in an opposite direction from it*—if with iron door .... .25
If without iron door .... .50
Communicating with fuel room by door opening in *direct line of furnace feed*—if with iron door .... .50
If without iron door 1.00
SHAVINGS OR FUEL ROOM. According to standard—of brick, with iron covers to all openings, whether for the admission or removal of shavings—if not so constructed, to be outside of mill, and where its burning would not endanger the mill. If without steam jet .... .10
BLOWERS. If none to remove shavings to fuel room .... .25
BOILER CHIMNEY. Of iron, through roof 1.00
If metal stack on brick or stone base rising at least 5 feet above boiler house roof, not less than .... .50
No spark arrester .... .25
DRY-ROOM. To be cut off and according to standard recommended on page 409.
FORCE PUMP AND 2½ INCH HOSE. If without, add ..... .25
CASKS AND PAILS. Water salted—in every room. If without .... .50*
SPRINKLERS. None .... .25
STEAM JET. In main mill, shavings vault, dry-room; if

*This charge intended to secure so important and inexpensive a precaution.

none, charge for *each room* .... .10

SASH AND BLIND MAKING 1.00

NIGHT-WORK. Two-tenths ($\frac{2}{10}$) of rate per hour of night-work.

In view of the combustible nature of the materials and dust of planing mills, it is a serious question as to whether any obtainable rate is adequate for night work. Not less than double rates should be charged for mills running at night, and short rates for short periods Mills running only a portion of the evening should pay at the rate of two-tenths ($\frac{2}{10}$ or $\frac{1}{5}$) of the rate for each hour of night-work; for example, a mill rated at five per cent. running two hours every night, should pay $\frac{4}{10}$ of 5 per cent. extra, and, therefore, if desiring the privilege for a month, should pay short rates of two per cent.—or 40 cents per $100 extra.

The rate should be higher, in proportion, for running part of the night than for running the whole, as the presence of workmen, throughout the night, might secure the discovery and extinction of fire, whereas, in the case of night-work for a few hours only, the mill would be left, after a long day's work, with heated journals and in the worst possible condition for fire.

Covered lights should be a stipulation in the policy.

If by Water Power deduct one-fifth.

EXPOSURE. Charge according to hazard.

While substantial brick or stone mills are more desirable, on many accounts, than frame structures, it should be remembered that wooden buildings burn off more rapidly and with less damage to substantial contents, such as planing machines, engines, boilers, pumps, etc., and too great a difference in rate should not be made in favor of brick mills for this reason. *Refer applications for insurance of planing mills to the company, in all cases.*

Plaster Mills. Refer to company with full particulars as to arrangement of furnaces for heating the calcining kettles and the handling of the freshly calcined calx or finished plaster, and the other hazards come in contact with. Buildings are usually cheap and boilers and chimneys need careful inspection.

Playing Card Manufactories. (See Card (Playing) Manufactories, page 438.)

Plow Manufactories. Small hand-power shops usually rate about like wheelwrights. Steam shops; report as to boiler room, dry-room, painting, woodworking, etc., etc.

Poorhouses. (See Almshouses, page 426.)

Pork Houses, Packing Houses, Etc. Refer to company, in advance of the season, for approval, after which policies may be written by the agent. In inspecting risks of this class the following hazards, together with the incidental ones often found in large establishments, should be investigated: Rendering and lard tanks, oleo kettles, bone boiling, tankage drying, dry-rooms for bones, bladders, press-cloths, hair, etc., smoking, branding, sulphur burning, storage of saltpetre and lime, coopering, repairing and the general grease hazard.

RENDERING is usually done in large vertical iron tanks, generally steam heated. This method is much safer than direct heat kettles, but grease, under a comparatively low pressure, generates a very explosive gas, readily ignited by contact with flame. For this reason, no lights should be permitted in the lard room, and proper ventilation should be provided to permit the escape of such gases. In addition to this there is the steam pipe ignition hazard, and the clearance of pipes and tanks from wood should be looked into.

If direct heat kettles are used, they should be well set in masonry, the tops of kettles being one inch higher than the surrounding brick-work, to prevent the piling up of fat beyond the capacity of the kettles. The wall should be covered with an iron plate having a guard around it to prevent the escape of grease, and metal extinguishers should be suspended over the kettles, to be let down in case of fire. Tight-fitting covers are better extinguishers for burning grease than water. No woodwork should be exposed in the lard room, and the ceilings should be, at least, ten feet above tops of kettles, the floor being of earth, brick, concrete or stone.

Fires should be carefully extinguished under all the kettles, at night, to prevent their flaming up again, during the night, and setting fire to the grease. Carbonic acid gas fire extinguishers are valuable for extinguishing burning grease and should be provided.

Where rendering is done by kettles, the *flues* to the furnaces should be carefully built, the walls being, at least, 12 inches thick built from the ground. (See page 406.)

SMOKING. This should be entirely outside of main building or cut off by a fire wall, rising through and above roof, with iron doors, which may be improved by having "eyesights" or apertures in them, to enable the man in charge, or smoker, to examine the interior, without opening the door and admitting air. Nozzle holes, also, for the use of hose or, better still, for the use of carbonic acid gas extinguishers, in case of fire, should be provided.

At a distance of not less than nine feet above the fires, and three feet below the meat, a perforated iron floor should be provided, which will serve the double purpose of *preventing the falling of meat on the fires* and of distributing the ascending smoke so that the meat in all parts of the room will be reached. The fires should be so protected that the drippings of meat cannot fall on them. *Ventilation must be provided* to prevent the accumulation of explosive gases evolved in smoke houses. It is well known to intelligent and experienced pork packers, that meat is better cured *by a current of smoke* than by *confined* smoke, and that no saving is secured by the absence of proper ventilation.

Numerous fires have occurred from the gases formed in smoke-houses. A notable instance was the explosion in the smoke-house of Muldoon & Sharp, in St. Louis. A fire was discovered near the centre of the meat, but it was merely smoking or smoldering. Water was introduced and an explosion of the gases followed—windows and brick-work being shattered. "Simultaneously with the report (probably from the admission of air) the flames arose in immense volumes, where before had been only dense, black smoke."

The origin of this fire was attributed to the *drippings from hams upon the fires.*

As I write, news comes of the destruction (November 16, 1902) of the large Armour packing plant at Sioux City, Iowa, and reports of tremendous explosions, which shattered buildings, due, probably, to gas explosions, although the explosions of the ammonia supply tanks are mentioned specifically as

causing serious damage, and enforcing the importance of having such supply tanks safely located.

The "singeing" process of removing the hair from hogs is frequently unsafe. When it is a feature of the risk, it should, in all cases, be done outside—the straw used not being kept where it would expose the building.

Inspectors should notice whether safe lights are used. Cutting and packing is often done at night and hands are frequently careless. Decline any risks where workmen are permitted to use, for candlesticks, such substitutes as pieces of meat or wood, empty bottles or iron nuts.

SLAUGHTERING. This should be so managed as not to be a nuisance to those owning property in the vicinity.

In insuring pork houses, it is probably unnecessary to remind agents that they should not write *annual* policies, at the current rates, for the full line of the company, upon the building or stock, thus cutting the company off from the more profitable *short-rate* business on stock.

When necessary to write an annual policy for a small amount, *it should expressly prohibit all of the privileges* of slaughtering, rendering and smoking, in order to insure their being paid for, when the season commences. It is necessary to prohibit them expressly, because a policy on a building privileged to be occupied as a "pork house," might be claimed to permit, inferentially, the processes incidental to a "pork house." Any policy, therefore, not expressly granting the privileges, for the usual premium charge, *should expressly prohibit them*, as follows: "*smoking, rendering and slaughtering not permitted under this policy.*"

When privileges are granted, the following are the rules of the National Board:

"Policies, in all cases, to limit the time of privileges in writing, or when not granted, written stipulation to that effect to be made.

"All privileges granted must define the period for which such privileges are granted, by an explicit provision, giving beginning and expiration of the period, in form substantially as follows:

"In consideration of $............privilege is granted for............days ....privileges (here insert slaughtering, rendering or smoking, as the case may be,) beginning on the.............day of..............190.. and ending on the..................day of..................190..at noon."

Potteries. Report fully as to drying ovens, kilns, storage of wood, etc. They have been unprofitable as a class, and the company will require full advices. The packing-room hazard is a serious one, necessitating the use of large quantities of hay and straw, and should be separated from the other buildings. There is also a serious hazard of explosion when the kiln is open: all kiln openings should be hooded.

Printeries. (See Bleacheries, page 432.)

Printing Offices. Inspect carefully for carelessness as to waste paper, oily rags, use of benzine for cleaning type, &c. Newspaper offices have a great deal of night-work, when tired and sleepy men are apt to leave the building at a late hour with dangerous conditions as to hot journals, discarded cigar and cigarette stubs, and fires are very likely to occur. The hazards of electrotyping and stereotyping, carrying with them the furnace hazard, and the use of hot lead in large quantities, are common to newspaper printing offices, and should be in rooms having fireproof floors, and the furnaces should be carefully inspected. Binderies are often connected, and the company should be advised of the extent of this hazard.

Prisons. (See Penitentiaries.)

Public Halls. (See Halls, page 475.)

Pulp Manufactories. The grinding process is usually a wet process and supposed not to be dangerous, but explosions have occurred in factories using the chemical process, which would indicate that chemicals which cause them may be used in the digesters. One such happened in August, 1902, causing the loss of seventeen lives and great damage to property. Just what caused the explosion has not been ascertained. The digesters are filled with steam under high pressure, and it is possible the explosion was due to steam.

In chemical pulp factories the furnaces for reclaiming the chemicals should be separated from the other buildings. The cutting of the wood into chips results in an accumulation of waste wood in dangerous condition for ignition, that part of the wood not used for pulp being usually used for fuel under the boilers. In steam power plants it makes the boiler hazard just as bad in such cases as the same hazard in a woodworker, of

back draft, &c.; so that in most cases, if not all, the boiler should be outside and cut off from the other buildings.

Decline chemical and sulphite mills unless furnaces are outside where they would not burn the main buildings.

Quartz and Stamp Mills. These do not suggest serious physical hazards at first sight, but they have not been profitable. Possibly sufficient moral hazard exists in the class as to unprofitableness of particular mills to explain the mortality. The company would require full advice before authorizing lines, and full rates.

Quilt Manufactories—Comforters, Etc. Using cotton battings. These are rarely insurable; cheap work and great physical hazard. Obtain consent of company before binding.

Rags. Rags in iron tied bags, with no assorting, may be insured at full rates. Where assorting is done the danger of spontaneous combustion is too great and so much care is necessary that it is best to let the rag-man insure himself. Few companies insure rag risks. Consult company before binding.

Railroad Property. This has been unprofitable as a class, and when rates are raised to the point of adequacy the railroad men immediately insure themselves with the exception of such particular structures, bridges, machine shops, or otherwise, as to which they have apprehension or the value of which exceeds an average line.

Rectifying Establishments. The cold process has little physical hazard beyond the possible ignition of large bodies of liquor exposed to vapor ignition. The hot process is that of a distillery and should pay same rates.

Reduction Works. (See Quartz Mills.)

Refineries, Oil. (See Oil Refineries.)

Reform Schools. (See Houses of Refuge, page 511.)

Remote Risks. Obtain the consent of the company before binding, giving full particulars. A remote risk of any kind is likely to be undesirable; manufacturing establishments, because they are too far away from transportation facilities to be profitably occupied; hotels, because they are likely to be used for unlawful purposes, road houses, etc.; dwellings, because no one wants them after those who build them get through with them

—and those who build them soon find they are too far away from neighbors to be pleasant. Such property is usually not salable and is likely to be neglected. The agent must be careful to confine himself to the territory named in his commission; his company needs not merely initial knowledge of a risk, but frequent supervision of it.

Rice Mills. Notwithstanding the fact that there is little physical hazard apparent about a rice mill outside of the boiler room, they have not proved profitable risks even at what seemed to be full rates.

Road Houses and Outskirt Saloons. The shady character of the majority of these houses makes the class undesirable. Decline them.

Rolling Mills. Refer to company. Modern mills are almost fireproof construction, but there is a large class of cheap frame mills with low wooden roofs which would not pay at obtainable rates. If wooden or shingle roof it is best to decline.

Roofing Material Manufactories. Decline. They are usually cheap structures with exceedingly dangerous materials liable to running fires of pitch, asphalt, &c.

Rope Walks. These require full rates. The class has not been profitable.

Rubber Works. (See India Rubber Manufactories, page 511.)

Safe Manufactories. Examine forging, japanning, varnishing, painting, etc., etc., and report fully.

Salt Blocks or Works. These are usually cheap wooden structures, particularly liable to take fire easily in summer, in dry seasons, and are often connected with sawmills or other exposures. The old-fashioned block is fast disappearing, because the more modern method of evaporating by steam is now used. Arrangement of boilers and steam-pipes is frequently dangerous, and the size of the structure makes a high rate necessary.

Sanitariums. Most of these have all the hazards of season hotels, with a possible moral hazard involved in case of loss of reputation for curative purposes. Many of them involve the hazards of insane asylums, especially those for the cure of the liquor habit. The company will want full advice on all these points. Sanitariums should be constructed on the lines recommended for Hotels, which see page 479.

Sash and Blind Manufactories. (See Blind Manufactories, page 432.)

Saw Factories. Report fully as to metal working, and wood-working of handles, etc. The stock is a damageable one by water as well as by heat.

Saw Mills. A serious moral hazard attaches to all mills which have exhausted the timber convenient to them, if the cost of procuring logs is such as to prevent their competing successfully with mills more favorably located. A moral hazard is, sometimes, connected with water-power mills, also, when the supply of water is not sufficient to keep them in constant operation. Examine carefully, all boiler rooms, to see that combustible material is not stored over the boilers, and inquire as to *journals under floors.* They are objectionable as they are liable to be covered up and neglected.

Examine as to storage of lubricating oils, and see page 405 for an instance where oil was stored over the steam-boilers.

Decline all applications for insurance on dilapidated, unpainted mills, with old machinery and worn-out boilers. There are many such. *Roof sprinklers* would be desirable fire appliances for saw mills. (See page 422.) A roof-sprinkler saved a large mill at Williamsport, Pa., the fire burning lumber near the mill without igniting it.

In this case the sprinkler-pipe ran along the *ridge of the roof* and *under the eaves, on each side*, and kept the roof and sides of the mill thoroughly wet.

Where the boiler-house of a saw mill is built of brick or stone, with iron roof or girders, neither adjoining nor communicating with mill building, no charge need be made for metal stack.

Schoolhouses. (See Academies, page 423.) The tendency to total losses on this class has been greatly increased of late years, by systems of ventilation for forcing fresh air throughout the building, such as the Sneed Process. Of course, fire follows the hollow air ducts and the building becomes practically a pair of lungs for breathing flame. A valuable schoolhouse was lately burned in Indiana in this way and was a total loss to the insurance companies. A higher rate should be charged for this system of ventilation—at least 25 cents extra per hundred dollars.

Segar Manufactories. (See Cigar Manufactories, page 442.)

Seeds and Seed Warehouses. Decline.

Shirt, Collar and Cuff Manufactories. Confine lines to buildings. Machinery and stocks have been unprofitable risks. Report fully as to laundry hazard.

Shoddy Mills. It is safe to decline these; few companies write them; the physical hazard is too great for obtainable rates, and a moral hazard is also frequently involved. They have the hazards of picking, with a low grade of stock and a large amount of waste in the card room. The picking hazard should be in a fireproof apartment where it could not possibly burn the mill.

Shoe Manufactories. These have not been profitable risks even in New England, where probably the industry is more extensive than in any other section of the country, a fact which ought to have led to the detection of causes of fires and the best means of preventing them. The use of rubber cement has been largely controlled as a fire hazard but care still needs to be observed. The use of lamp-black may result in fires from spontaneous combustion if mixed with oil, and many persons are ignorant of this fact. The scrapings of cutting boards and benches should be carefully removed from the building as they are also liable to spontaneous ignition. Examine carefully as to the heating of paste, wax cups and kit lamps, drying of pasted stock, disposition of refuse from buffs, brushes, sandpapering machines, edge-trimmers, etc., swinging uncovered gas jets, storage and use of benzine, turpentine, etc. Cleanliness should be observed everywhere.

Shot Towers. Decline. They are liable to fires and it is almost impossible to extinguish them on account of their great height where they are gravity towers.

Shuttle Manufactories. (See Bobbin Manufactories.)

Silk Mills. The physical hazard of this class seems to be a clean one but rates have been too low and the premiums have not equalled the losses and expenses. Fires spread rapidly and losses are usually total. The loading of certain kinds of silks and cordonnet with oil has been disastrous. Stocks of this kind are particularly liable to spontaneous combustion. They should be held to the same rules of construction, management, fire appliances, etc., etc., as cotton and woolen mills.

Skating Rinks. Decline.

Slaughter Houses. When rendering and the use of fire heat are not connected the physical hazard is not serious but they are almost invariably nuisances to all neighbors and the class has been unprofitable. They should not be written in any case without the consent of the company first obtained on full report. In connection with pork houses they may be taken as part of the pork house risk.

Smelters. (See Quartz Mills, page 535.)

Smoke Houses. (See Pork Houses, page 532.)

Soap and Candle Factories. These are sometimes nuisances where rendering is done and involve serious physical hazards. We should not be bound on them without consent of company first obtained. It is not likely that lines will be accepted, even at full rates, if rendering is done.

Spice Mills. These are undesirable. The physical hazard of grinding is considerable and the susceptibilty of the stock to damage by water or smoke makes ordinary rates inadequate. Moreover, a fire in a spice mill results in a condition of atmosphere which prevents firemen from entering the building, and fires are very apt to get beyond control for this reason alone.

Spool Manufactories. Advise as to woodworking hazards.

Sponging and Refinishing Works. Advise fully as to use of heat and processes. They are not bad risks at fair rates. Most of the stock is cloth in rolls.

Stables—Boarding, Car, Express, Training, etc., etc. (See Livery Stables for physical hazards.) Avoid insurance on animals of fancy values, stallions, racers, etc. We cannot afford to pay large amounts, as already explained, from the suffocation of a single pair of lungs by smoke from a little burning straw or hay.

Stallions. Decline. A slight injury to these animals sometimes reduces their value 95%, and no obtainable rate will pay for the risk.

Stamp and Quartz Mills. The hazard most to be feared in this class of risks, probably, is the moral hazard as to the profitableness of the mill, permanence of supply of ore, etc., and the convenience for transportation facilities both ways. The physical

hazards are simply those of steam boilers and machinery, with an added hazard of the liability to friction in journals and, therefore, overheated journals from the fine powder, which is apt to ruin them and which is a result of the process. They should rate high, and the company should not be bound, under any circumstances, without its consent first obtained on full advice; as it probably has information with regard to each hazard in its office. (See Quartz Mills.)

Starch Manufactories. These risks have been unprofitable to companies. The drying of starch is a dangerous process and should be completely isolated. Fires in the dry rooms are peculiarly rapid and thorough inspection should be made. In fact, we regard the hazards of a drying kiln as not ratable and the contents as uninsurable. They should be entirely outside of the main structure. Dust explosions are frequent. The flour or grinding mill hazard should be examined. If the dry kilns are completely outside of the factory (to communicate even with iron doors is objectionable) submit full survey to company. *Potato starch factories* are written by few companies and then only at very high rates.

State Houses. Same as Court Houses, (see page 455.)

Stave and Heading Manufactories. (See Barrel Factories, page 430.)

Steamboats. These should be referred to company. Avoid old boats and boats running at a loss to owners or on a line where destructive competition exists or boats are laid up in consequence of competition. They are sometimes burned by rival interests. In applying to the company for insurance on steamboats advise as to *age*, *value*, *ownership*, *fuel burned*, *general character of freight carried*, *and route* (which latter should be limited in the policy,) and especially whether a paying investment to owners. The Marine ratings are important, and no boats rating lower than A 1½ should be taken. Where boats are laid up during the winter the location of winter mooring should be ascertained and the company advised. It quite frequently happens that all the boats of a line are moored for the winter not only in dangerous proximity to woodworking and other special hazards on the water front, but so near to each other that they would inevitably be destroyed by a single fire

and the Company might have as many lines involved as there are boats. In considering the possibility of assistance from fire-boats, harbor tugs, etc., the probabilities of inaccessibility in winter owing to ice must be taken into careful consideration. The Company would want advice as to all of these facts and as to the number of watchmen employed, etc., etc. Steam tugs and steam dredges have been particularly unprofitable. Excursion boats are worth 50% more than regular trip boats.

Stereotypers. (See Electrotypers, page 461.)

Stock Yards. Cattle Pens, Etc. These should be examined carefully as to storage of hay and straw, carefulness of employes as to matches, lanterns, etc., and proximity to special hazards. The Company would require full advice before authorizing lines.

Stove Foundries. (See Foundries, page 471.)

Straw Board Mills. (See Paper Mills, page 522.)

Straw Goods Manufactories. Refer to Company with full particulars as to bleaching, drying, etc. These hazards should be entirely separated from danger to the main values.

Sugar Refineries. These risks are seldom found outside of large cities, where they are controlled by large corporations. The buildings are unusually high and a fire once started in them is likely to prove total. They are liable to spontaneous combustion in the char house and should be carefully inspected as to boiling and other heat processes. They are generally, however, carefully managed. It is seldom that they should rate less than 3½%.

Sugar Houses on Plantations. Advise fully as to the heat hazard, especially as to the fuel used and the care of management. They have not been profitable as a class. The method of handling cane, however, is undergoing a change. Large plants for this purpose are located at central points and buy their cane from the planters, so that many of the old-fashioned sugar houses are out of use. They should be reported on as to this condition.

Tack Manufactories. These have been very unprofitable. It would naturally be supposed that tacks being incombustible are not liable to damage. On the contrary they will rust from water thrown, and heavy claims result, especially from un-

scrupulous owners; and after severe heat the entire contents of a box of tacks will be found almost inseparable, a solid mass of worthless iron.

Tanneries require the most intelligent examination and supervision to escape the moral hazard attaching to many risks. Physically, they are much improved by the complete isolation of the bark mill and boiler room, and by the stacking of bark so that it will not expose the tannery or be exposed to locomotive or other sparks. Bark-dust is very retentive of fire; in fact, it is almost impossible to extinguish a fire in it when once kindled, and after a fire is supposed to be out it may conceal and carry sparks for hours. No lights, fires, or smoking should be permitted, and where spent bark is used for fuel, under the boilers, the boiler-room, as before stated, should not expose the tannery. (See Bark Mills, page 429.) Care should be taken to arrange the conveyers of bark to the boiler rooms so that they may not prove conveyers of flame, in case of fire. The boiler chimney should be of brick, as recommended on page 406, and should be provided with a spark arrester. Care should, also, be observed in the storage of lime. The loosening of wool from skins is sometimes dangerously managed. A serious moral hazard sometimes results when the supply of bark has been exhausted, necessitating its transportation, at great expense, from a distance. "A. 1" ownership, and location in cities or large villages, usually insisted upon. *Refer all applications for insuring tanneries to the Company.*

Telephone Offices, Central Stations. These must not be insured without consent of Company first obtained, submitting the proposed form. The switchboards especially are very susceptible to damage and are often of large value; that of the telephone exchange in New York, it is said cost half a million dollars.

Water pipes, which would be liable to leak, or automatic sprinkler pipes, are objectionable over switchboards, unless canopy shelters are arranged to carry water past the contact points. Such shelter should also be provided over dynamos.

Theatres, Opera Houses, Etc. These risks as usually constructed, especially in country towns, are uninsurable at obtainable rates. When built in accordance with obvious rules of safety, we may

begin to write them; but as at present constructed, they are unprofitable risks. They are carelessly managed. The carpenter shop, paint shop, etc., expose the main building, whereas they should be entirely outside where their burning could not injure the theatre, and the construction of the stage, with its great depth for lowering scenery and its great height for raising it, with highly combustible scenery painted with inflammable paints, wooden shifting appliances in a dry state, flies, rigging loft, etc., etc., it is almost impossible to extinguish a fire when once started. Carelessness of actors and employes as to cigarettes, cigars, etc., and the fact that all of them leave the building at night too tired to be careful to see that all fires and lights are out and that no fires are smouldering, makes them exceedingly dangerous. Many of the exhibitions, moreover, use dangerous materials for scenic effects and fireworks, and the fire appliances are seldom of the best. The day will, probably, come when all theatre and opera houses will be required, by law, to be securely divided into two separate risks, by a fire-wall running through the roof—effectually cutting off the stage, dressing rooms, carpenter shop, etc., from the auditorium, a fireproof curtain or drop door being so constructed as to cut off all communication between the stage, with its scenery, and the rest of the building. The draught formed by opening the doors, for the exit of an audience, would have the tendency to draw the smoke, gases and flame of a stage fire into the auditorium (as in the case of the Brooklyn Theatre), to the great danger of those who might, otherwise, escape. For this reason, the wall should extend through the roof, effectually cutting off all communication between the stage and *the empty space or attic usually left between the ceiling of the auditorium and the roof.*

All passageways, hall-ways, etc., should *gradually widen* to the point of exit, sharp angles and corners being avoided. This simple precaution would prevent the choking of a passage by a crowd, as it would be impossible to block up a passageway so constructed. Under no circumstances, should a hallway be narrower, at any point in its length, than at its exit beginning. Strong iron railings, *without balustrades*,* should

*Balustrades are objectionable as, in case of a leg or foot becoming caught in them, they might lead to an obstruction of the passage.

be provided on each side of all staircases, as they would assist in preventing the falling of individuals and other ill effects of a rush. The terrible disaster in the Brooklyn Theatre, in December, 1876, by which over three hundred human beings perished, would indicate that the *floors and supports of halls and staircases* should be much stronger than the other portions of the building, and that the strength required by law to bear the safe loading (see page 90) is not sufficient, in view of *the vibration and sudden strain* caused by a rush and panic of the inmates.

Doors to places of exit should always *swing outwards*, and each section of seats should have a separate exit, to avoid the crowding incidental to an alarm of fire and a panic on the part of the inmates.

The New York Building Law is very stringent. It requires that there shall be at least one front on a street and, unless on a corner, that there shall be passageways on both sides of the building for the escape of the audience. This would facilitate, also, the operations of the firemen. To overcome differences of level between courts, corridors, lobbies, etc., gradients or inclined floors must be employed instead of steps, with a rise of not over 1 foot in 12. All doors are required to open outwards and to be fireproof. No workshop, storage or general property room is allowed above or under the stage or auditorium or in any of the fly galleries. They may be located in the rear or at the side of the stage, but it is required that they shall be separated by a brick wall with fireproof doors. The staircases are required to be enclosed in brick walls and fireproof, and a proscenium wall built of brick is required between the auditorium and the stage and extending at least four feet above the stage roof, with a fireproof curtain to protect the opening, sliding within iron grooves with a lap of not less than six inches on each side of the opening. Skylights are required over the stage, so constructed as to open instantly on the cutting or burning of a hempen cord, to admit of the escape of smoke or gases at the early stage of a fire. The stage is required to be of fireproof materials and the fly galleries, including pin rolls, to be constructed of metal with fireproof floors. The rigging loft is also required to be fireproof, and the stage scenery is to be saturated

with some fire resisting material or chemical. The walls separating the dressing rooms, and the partitions dividing the dressing rooms, are required to be fireproof. Circular or winding stairs are prohibited. The width of staircases is proportioned to the seating capacity. All staircases over 8 feet in width are required to have a center hand rail of metal, strongly supported by metal standards, to prevent individuals from falling on the stairs in a panic. Automatic sprinklers are required over the stage, with standpipes at each proscenium opening. Fire hose, casks of water, and buckets, and other appliances for extinguishing fire, are to be provided, and a fireman from the city fire department is required to be present at every performance. Oil lamps are required on shelves, to be kept lighted, in case the electric lights or gas lights become extinguished. Every city and town in the country would do well to enact a law on the lines of the New York regulations. The precautions observed in Paris might, with profit, be followed here—those of permitting no performance to take place without a small engine stationed on the stage, with two or more experienced firemen in attendance.

Some of the fires in this class of risks may be due to the spontaneous combustion of scenery canvas, painted in oil colors, and rolled up when not in use. (See page 145.) While in use exposed to currents of air, it would not be dangerous, except from its liability to ignite upon contact with flame, but when rolled up or covered up, in any way, so as to confine the heat generated spontaneously, it would be very liable to burn.

The fact that so long ago as 1830 Mr. Braidwood, Superintendent of the London Fire Brigade, recommended the simple but important precaution of cutting off the stage, with its accompaniments of dressing rooms, storage rooms, paint room and carpenter shop, from the auditorium, by a fire-wall and iron curtain, and the fact that, up to this time, there are only a few cities which require it, shows how little attention is usually paid to the opinions and suggestions of experienced and practical firemen. If these curtains should be double, with an air space between the two, they would be better, and, besides, in case one should not happen to work, the other might. It should be the business of a particular individual, regularly and judiciously

stationed for the purpose, to attend to the letting down of the curtains, in case of fire, and they should be so arranged as to be closed *from the auditorium side.* Egress may be easily provided from the stage and dressing rooms for actors and employees. The simple provision of sprinkler pipes between these curtains, so arranged over the top of the arch and down the sides as to form, literally, *a curtain of water*, in case of a fire, would not only keep the iron from warping, but prevent the escape of smoke and gases into the auditorium. Such a provision would be somewhat similar to the spray of water used in connection with a hose pipe, to enable firemen to approach fire, without danger or discomfort.

A system of sprinklers above the scenery and woodwork of the stage is such a valuable protection that it should always be required.

While all appliances for the control of a fire and its extinction and for the escape of the audience, however, are desirable and imperative, it should be remembered that precautions for *preventing fire* are still more important, and, to this end, the scenery and woodwork of the stage, instead of being highly inflammable, as is now almost universally the case, *should be rendered incombustible* by preparing them with simple, inexpensive and well known chemicals.

All of the appointments of the stage—the scenery (often painted with oil paints), borders and woodwork—are of the most inflammable description, in some cases, benzine actually being used, and purchased by the barrel. It is unnecessary to state where this dangerous material is used on scenery, no provision of wire screens to protect foot and border lights would prevent fire, as the gas generated by the benzine would, itself, seek the gas jet and ignite through the wire.

Among the chemicals recommended for the purpose of rendering scenery uninflammable may be mentioned borax, alum and the tungstates of sodium or potassium.

The canvas, ropes, etc., may be soaked in a solution of tungstate of soda (one bucketful of the salt to seven bucketfuls of hot water) for thirty minutes, and when thoroughly dry, in a solution of silicate of soda, commonly known as "*soluble glass*," diluted in the same proportion. The same application

will render woodwork safe, but it is claimed that a solution of tungstate of molybdenum is better for the purpose.

Phosphate of ammonia is, also, recommended for scenery. It requires only one process and is, therefore, more convenient than the tungstates.

Thread Manufactories. (See Cotton and Woolen Mills, page 446.)

Tile Manufactories. Report fully as to character of buildings, arrangement of kilns, etc., etc. They are usually cheap affairs and uninsurable, and the Company will want full advice before authorizing lines.

Tobacco Barns or Curing Houses. These are farm risks located near the tobacco fields and are usually of light frame or log construction. The hazards connected with the drying process are serious, and usually poorly guarded, and the class has been unprofitable. The salable character of tobacco tempts dishonest parties to rob them at night and set fire to them to cover the theft, which is probably the reason that enough are burned out of one hundred to make obtainable rates inadequate.

They cannot be safely insured during the time when fire heat is used, and for this reason annual or long term policies must not be written without the following clause:

"*The use of artificial or fire heat is not permitted while this policy is in force.*" This will insure notice when fire heat is used.

The arrangement of tobacco for curing in a tobacco barn presents every element of danger. It is usually hung on sticks and so arranged as to hang higher in the centre than on the sides, leaving a hollow space in the centre. In the middle of the floor a log fire is made, any sparks from which, as when the fire is being fed, are liable to ignite the tobocco. We prefer to take no chances, Seventeen barns controlled by one concern were burned in two weeks.

As already stated under heading "Tobacco Prizing and Rehandling Houses," those hazards are sometimes insured as barns, when prizing and rehandling houses are the risks covered.

Decline tobacco barns for tenants.

Obtain consent of company before binding.

Tobacco Prizeries, Stemmeries and Rehandling Houses. Refer to Company. These risks are often in towns with fire department protection, but on account of their light construction combined with the large quantities of loose and hanging tobacco, total losses usually result when they once get on fire. The chief hazard is the use of steam for "ordering" and drying; pipes should be kept free from woodwork and not under the drying tobacco where it could fall on them. Dry room should preferably be cut off from main building. No smoking or lights should be permitted. Casks of water and pails should be liberally provided.

The class, as a rule, may safely be declined. It has been very unprofitable. If any exceptions can be made it is only in the case of houses in towns having a population of 2,500 or over, where the warehousemen are monied men and do a small prizing and rehandling business to accommodate producers in the immediate vicinity of the town. The smaller houses in the country may be regarded as uninsurable. Books of account are generally burned with the house, and the only book produced by the owner is usually a small pocket, pencil memorandum, wholly unreliable.

Houses using fire heat, in districts producing dark, heavy tobacco, are especially dangerous while in process of drying, fire heat being necessary to cure the heavy, large tobacco growing on low, flat and black soil, like that in certain sections, which tobacco is full of water and cures too slowly without fire heat. It is largely stemmed for the English market.

Tobacco raised on hilly ground is usually a light, small leaf, does not require heat, and the fire risk is a better one.

It is customary to call prizing and rehandling houses tobacco barns, and care must be taken to see that the company is not insuring a more objectionable risk under the description of a "barn." As already stated, however, it is best to decline risks outside of important, larger towns, with fire departments.

Tobacco Storage and Sales Warehouses. Physical hazards connected therewith are not important, but if a fire once starts serious loss usually results. No smoking should be permitted during sales. Obtain from Company at the beginning of the season the maximum line it is willing to carry.

Tobacco Factories. Refer to Company, with advices regarding the class of goods manufactured, and the processes connected therewith. Special attention should be given to arrangement and location of dry rooms, dressers or steamers (these should be located outside -if inside an extra rate should be charged); and flavoring or licorice kettles should be safely arranged on the ground floor. If fine cut or smoking tobacco is manufactured look carefully into the heating apparatus connected with the rotary dryers. Presses should be insured specifically and separately from machinery or fixtures. Keep stock lines down on account of susceptibility to damage.

Experience teaches that large claims are sometimes made on tobacco, after a fire, where the actual loss is trifling.

Toboggan Slides. Decline.

Tool Manufactories. (See Hardware Manufactories, page 475.)

Town Halls. Same as Court Houses, (see page 455.)

Toy Manufactories. Few companies write these, even at high rates; the physical hazard and susceptibility of stock to damage make obtainable rates inadequate. Wooden toy factories have all the hazards of woodworkers, together with the additional hazard of painting, generally done by dipping. This should be carried on in a separate compartment where it would not endanger the main values, and the room needs to be freely ventilated, as the paint is usually thinned with benzine or naphtha. The company should be consulted before binding.

Traction Risks—Horse Car, Trolley, Etc., Etc. The Company will want full advice as to the motive power. If by horses or mules, they will want full advice as to the stables; also as to whether stoves are used in the cars; if not, how heated. Numerous fires have occurred from carelessness as to stoves, and also from electric heaters when trolley poles are not removed from the wires as soon as cars are brought into the barns. Co-insurance to the extent of 80% of value will be insisted upon, and cars will not be insured under any circumstances without co-insurance or at low rates. (See Car Stables, page 438.)

Training Stables. (See Livery Stables, page 515.) Blooded animals of fancy values may safely be regarded as uninsurable at obtainable rates. We prefer to decline them.

Trunk Manufactories. These have been exceedingly unprofitable. The physical hazards of woodworking, gluing, etc., etc., justify full rates. Painting and japanning should be cut off.

Tug Boats. (See Steamboats).

Turpentine Distilleries. Decline. Structures are cheap and the hazard of ignition serious.

Type Foundries. These are unprofitable as a class. They are usually on the upper floors of buildings, are too often carelessly managed; and the melting arrangements are often on shabby wooden platforms covered with a single brick in thickness, with room between the bricks to allow ashes, etc., to sift down between, only serving to conceal charred floor conditions.

Upholsterers. (See Mattress Factories, page 515.) The physical hazard of picking combustible material, &c., is sufficient to justify higher rates than those obtained, to say nothing of other dangers.

Varnish Factories. Full rates should be charged. The burning should be entirely separate from the other processes and values and in a fireproof structure, and not covered by the policy. The fact is the class do not usually pay adequate rates, except for fireproof establishments, which as a rule are not insured.

Vessels. (See Steamboats.)

Vinegar Manufactories. Those manufacturing vinegar from fruit, apple cider, etc., are not serious risks if properly constructed. Those that use alcohol should be declined.

Wadding and Batting Manufactories. Decline. (See Batting Manufactories, page 430.)

Wagon Manufactories. The large works involve all of the woodworking hazards, especially the naphtha paint hazard, together with the usual metal working hazards, and the Company should be advised fully as to all of these. A full-fledged wagon manufactory is practically a machine shop, planing mill, saw mill, and paint shop combined. Small wheelwright shops are profitable at fair rates.

Wall Paper Manufactories. These risks have never paid at current rates. Aside from the physical hazard of paper mills they have the hazard of chemicals, coloring processes, sizing, etc.,

etc., and the stock is exceedingly susceptible to damage by water and, it is claimed, also by smoke. In fact, claims upon wall paper have been so serious of late years, even in the case of stocks of stores, that the companies find it necessary to decline them unless in conscientious hands and at very full rates. In a recent instance it was claimed that a stock of wall paper, which had been damaged so slightly to all appearances that the adjusters thought the damage was only $2500, was damaged to a considerably greater extent. The companies were confronted with demands for an appraisal, which resulted in an award of over $80,000, the owners claiming that defects in the wall paper, owing to chemical reactions due to the heat and smoke, might develop months after the paper was on the walls of dwelling houses. Such claims would justify declining the class unless at rates which would practically be prohibitory. The drying process is a dangerous one, the arrangement of stock forming ideal conditions for the quick spread of fire. Losses are usually total.

Waste. "clean." It is often the case that cop and other waste, silk noels, etc., are claimed to be so clean as to warrant low rates of insurance, but the claimant overlooks the fact that almost any collection of so-called "clean waste" is liable to have in it oily waste, where an employe in a manufactory has used a small portion for wiping off machinery, and it is safe to decline any risk on the material and to assume that there is no such thing as "clean waste."

Watch Manufactories. The physical hazard of this class is not serious. Advise the Company fully as to construction, use of fire heat, carefulness, etc., etc. The stock is very susceptible to damage and should pay full rates. It is more damageable in the exposed conditions of unassembled parts, as in a factory, than in the case of finished watches in a jewelry store, although some underwriters seem to regard a watch manufactory as favorably as a jewelry store. All the machinery is delicate and easily ruined.

Water Cures, Sanitariums. (See Sanitariums.)

Weaving Mills. (See Cotton and Woolen Mills, page 446.) In this class of risk the spinning, carding and picking hazards would be eliminated, the mill buying its warps.

Wire Works. Advise Company fully as to construction, carefulness of management, etc. They have not been profitable risks. Report fully as to the use of oil for tempering, and arrangement and location of apparatus. A fire occurred in the R. H. Wolff & Co. wire works, New York, caused by overheating of oil in a tempering furnace tank. The outlet pipe at the bottom of the tank became clogged and the heated wire passing through the oil raised its temperature to the point of ignition and fire ensued. This outlet pipe should be of sufficient size to prevent clogging. A fire occurred April, 1896, in the Washburn & Moen Mfg. Co. factory, Worcester, Mass. The oil used as a fuel in tempering and hardening furnaces was stored in two large tanks outside, being pumped to a secondary tank inside. It is probable that a small quantity of oil in the pipe, released by workmen in making repairs, flowed down upon a portion of the ovens. The ovens were not being operated but were hot enough to vaporize this oil and set it on fire.

Where electrical insulated wire is made the additional hazard of handling rubber and weaving the covering, etc., adds to the risk.

Wood. (See Cord Wood, page 445.)

Wood Pulp Manufactories. (See Pulp Manufactories, page 534.)

Woodworkers. The hazards of planing and saw mills, box manufactories, furniture manufactories, etc., have already been explained. They involve the hazards of all other classes of woodworking.

White Lead Works. These should be referred to the Company before binding and an additional charge of not less than 1% should be made where boiling of oil is done in the building or where its burning will expose the building. The class has not been profitable.

Willow-Ware Manufactories, or stocks composed wholly or largely of willow-ware, are not desirable risks at current rates. Such merchandise damages easily by smoke.

Wooden Ware Manufactories. These have been unprofitable to companies. The physical hazard is serious, especially as to dry rooms, and current rates are inadequate. Advise the Company fully before binding.

Wool Scouring Risks. It is difficult to account for the fires that have occurred in this class, but it is possibly due to the drying hazard. The scouring of wool is a soap and water process, water being used in large quantities, so that a large portion of the establishment is wet. New processes are being introduced involving the use of chemicals and benzine and should be carefully watched.

Woolen and Cotton Mills. (See Cotton Mills, page 446.)

Yachts. Refer to Company with full particulars. They are unprofitable as a class, rapidly deteriorate in value, changing with the whims of owners, who soon tire of them or want larger and speedier boats and lose interest in the safety of one well insured.

Zylonite Manufactories. (See Celluloid.)

N. B.—The reason for marking so many of the foregoing hazards as to be declined is that, *at current rates*, they are unprofitable.

When circumstances are so modified as to make them paying risks, companies are entirely willing to write them. In the meantime, where a number of special hazards, including those marked to be declined, are located at an agency, the agent should report the fact to the Company, in order that an inspection of them may be made by a competent special agent, and a specific understanding arrived at as to the insurance of them; for while, *as a class*, many of them may be bad, some may be fit to be insured at a proper rate.

FORMS OF POLICIES.

I approach this subject with a profound sense at once of its importance and of the difficulty of properly treating it. After the rate has been carefully computed the form of policy may be so worded as to literally cut it in two, perhaps in four, as was the case actually in a manufacturing risk of large values divided into four separate risks, where specific insurance was sought for a small percentage of the value in each and floating insurance for the difference covering in its range all four localities. Underwriters were deceived by the clause in the floater that the policy should not attach until the specific insurance was exhausted. It was exhausted one day in one of the four subdivisions and the floating insurers paid a total loss, whereas the specific insurers got off with salvage on account of the 80% co-insurance clause.

The late Mr. Clarence Knowles once described a floater as a policy which floats all around until there is a fire and then lights at the exact location.

It was recently discovered in the territory of the New York Fire Insurance Exchange that floating policies might be exhausted and the specific insurers escape with a still greater salvage under the standard co-insurance form of New York State, which provides as follows:

This Company shall not be liable for a greater proportion of any loss or damage to the property described herein than the sum hereby insured bears to eighty per centum (80%) of the actual cash value of said property at the time such loss shall happen. In case of claim for loss on the property described herein not exceeding five per cent. (5%) of the maximum amount named in the policies written thereon and in force at the time such loss shall happen no special inventory or appraisement of the undamaged property shall be required. If the insurance under this policy be divided into two or more items, these clauses shall apply to each item separately.

It will be observed that this clause does not provide that any specific amount of insurance shall be carried by the property-owner, but that the company shall not be called upon to pay a greater percentage of any loss than the amount of its policy bears to 80% of the actual cash value of the property. It would, therefore, be "exhausted" when it had paid all it could be made to pay in accordance with its terms.

Let us suppose, for example, a value of $100,000 in a given warehouse insured specifically for $20,000. A specific insurance to this amount in case of a $40,000 loss would be liable for only one-fourth of the $40,000, or $10,000, that being the proportion which twenty thousand bears to eighty thousand or 80%. The floating insurers, however, might claim that they were not liable until the specific had been exhausted, meaning thereby the whole $20,000 had been paid, which would make the floating insurance loss $20,000. But this contention would not hold under the phraseology of the clause, and they would clearly be liable for $30,000.

I was impressed while chairman of the Committee of the National Board of Fire Underwriters on Forms of Policies, which had repeated sessions, with the difficulty of drawing contracts which would be just alike to the companies and to the assured. In repeated instances phraseology which seemed so nearly right that a unanimous vote could have been secured upon it was afterwards found defective in one respect or another, necessitating reconsideration. The patience which the gentlemen composing the committee brought to the task and their willingness to listen each to the opinion of every other member resulted in the adoption of a series of forms which proved generally acceptable to the fraternity.

I believe this task of formulating contracts which shall cover all classes of risks and all conditions of hazards is the most important one connected with the business of insurance. The ablest lawyers should be employed; but lawyers alone could not deal properly with the question without the advice and judgment of underwriters, whose experience as to the construction of clauses and the handling of claims would be absolutely necessary for the proper performance of the task. They would, in fact, be more independent of the lawyers than would the lawyers be of them.

The standard form of policy of New York State was adopted by a combination of these two important elements, and the policy which has since been adopted by other States is the result of their conferences and combined judgment. It may be susceptible of improvement, of course, but as a whole it meets the case more clearly than any policy contract yet drawn. Those who framed it brought to their task an honest desire to make a policy which should not only protect the rights of underwriters, but be just to all honest claimants; and the phraseology of the contract was specially designed to meet the construction which had been placed upon ambiguous phrases by the courts of highest resort. It would be well in all cases of lawsuits to bear in mind when decisions are glibly quoted to sustain interpretations of particular phrases, that the policy in question before the court may have been very differently worded from the standard form now in use.

In a very early and celebrated case, a learned English judge remarked; "A policy of insurance has at all times been considered in courts of law as an absurd and incoherent instrument; but it is founded on usage, and must be governed and construed by usage." Another of the justices in the same case, Lord Kenyon, made the following statement: "I remember it was said, many years ago, that if Lombard street (the insurance thoroughfare of those days) had not given a construction to policies of insurance, a declaration on a policy would have been bad in a general demurrer; but the uniform practices of merchants and underwriters had rendered them intelligible."

From these two remarkable declarations, it may be inferred, not only that the insurance contracts of that early day must have been most unskilfully drawn, but that the first claimant in a court of law, under a policy, would have fared but poorly, since he would have had no usages or "uniform practices" of underwriters to plead in support and explanation of his policy; and we may also infer that the equitable and honorable practices of underwriters, even at that early day—practices which have ever been characteristic of the profession—rendered lawsuits to inforce just claims unnecessary until at some later date, when the first unreasonable policy-holder, possibly the first who developed a "moral hazard," found that the "uniform practices"

of underwriters had, at last, established a standing in court for his contract.

Since that early time in the history of underwriting, the form of policy has been altered and added to until we may imagine the learned judge, in the case mentioned, would have been astonished at the voluminous form of the insurance contract, framed to meet the adverse decisions of court after court, and to provide for one form of rascality after another, until, at one time, it filled whole pages of restrictions and conditions. Indeed, in a well-known insurance case, the judge remarked; "A modern policy is a very complicated contract. Before executing almost any other instrument of equal perplexity, the parties would deem it necessary to take advice of able counsel."

In its later form it met with criticisms at the hands of judges of a very different character from that of the ancient English justices whose opinions have been referred to, and it at last, became a grave question whether, in view of the prejudice with which its fine print and numerous conditions were regarded by both judge and jury, the underwriters would not secure more substantial justice in the courts of law to which they were sometimes driven by dishonest or unreasonable claimants, if they had shorter contracts, printed in larger and clearer type, relying more upon the substantial protection which the written and unwritten law extends to a contract in which one party reposes entirely in the good faith of the other.

In one case a distinguished judge, in speaking of the old form of policy before the jury, made the following statement: "Now we know, from common observation, that not one in a hundred of those who procure policies gives any attention whatever to the finely printed page containing the conditions of a policy. They cannot afford to expend the time required to study them over and they take it for granted that they would not be enlightened if they should." A learned chief justice of Massachusetts made a similar criticism. What the effect of such a declaration from the court would be upon a jury may easily be imagined by any one who has had experience in defending lawsuits brought against insurance companies, and who has observed the determination, frequently taken at the very outset of a case by the twelve disinterested men in the jury box, to disregard the

plainest provisions of a policy which is the undisputed contract between the parties.

A dishonest, selfish and short-sighted willingness to do injustice to an honest company, in order to secure for themselves immunity in the future from the consequences of their neglect of proper business precautions, not unfrequently led intelligent business men, when in the jury box, to forget the obligations of a juror's oath, and to ignore the violated conditions of a plain contract in favor of a dishonest claimant, ostensibly on the miserable plea of "fine print," but, really, because they feared that, at some time or other, they might themselves suffer from their own inexcusable neglect.

THE STANDARD POLICY OF NEW YORK.

Having this prejudice on the part of judge and jury, therefore, in mind and, at the same time, remembering that the conditions of a policy, when not intended for the information and protection of honest policy-holders, are designed to defeat fraud on the part of dishonest ones; the Commission of underwriters and lawyers appointed to frame The Standard Policy of New York approached the serious task of cutting down an important and well considered contract in order to meet a popular and unwise prejudice, with the determination to use extreme care and to be fortified with an intelligent reason for each and every alteration and elimination.

In his wonderful commentary on the English law, Lord Blackstone says: "The common law of England has fared like other venerable edifices of antiquity which rare and unexperienced workmen have ventured to new-dress and refine with all the rays of modern improvement. Hence, frequently its symmetry has been destroyed, its proportions distorted, and its majestic simplicity exchanged for specious embellishments and fantastic novelties." The commission were in no haste to prune and improve a contract which was the result of ripe thought and the outgrowth of years of experience on the part of wise men, and yield to a popular but mistaken prejudice, remembering that the interests of honest policy-holders, if they could only be brought to realize it, are best subserved by explicit contracts,

with conditions and restrictions which will entrap rogues, who are the enemies not of the insurance companies alone but of society itself.

The task of preparing a form of policy was not an easy one. It is difficult to provide for the cases which our experience teaches us are sure to arise. How much more difficult to provide for those which have not yet arisen, but which we may be sure will present themselves!

Language itself is imperfect. "If," says Vattel in his Law of Nations, "the ideas of men were always distinct and perfectly determined; if for the expression of those ideas they had none but proper words, no terms but such as were clear, precise, and susceptible only of one sense, there would never be any difficulty in discovering their meaning in the words by which they intended to express it; nothing more could be necessary than to understand the language; but even in this supposition, the art of interpretation would still not be useless. In all contracts it is impossible to foresee and point out all the particular cases that may arise. We decree, we ordain, we agree upon certain things, and express them in general terms; and although all the expressions of a general contract should be perfectly clear, plain and determinate, the true interpretation would still consist in making, in all the particular cases that may present themselves, a just application of what has been agreed in a general manner."

In this view, it behooves us to keep in mind the numerous rules of construction, and chiefly should we remember that most important one laid down by the same eminent authority last quoted, that "If he who could and ought to have explained himself clearly and fully, has not done it, it is the worse for him; he cannot be allowed to introduce subsequent restrictions which he has not expressed." And also that other significant rule laid down by a high court—"conditions and provisos in policies of insurance are to be construed strictly against the underwriters, as they tend to narrow the range and limit the force of the principal obligation."

In view of the numerous objections which have been urged against the old form of policy, it was deemed best to eliminate every condition which could possibly be dispensed with, having, a proper regard to the safety of the company and its honest

policy-holders; relying, in many cases, merely on conditions which would be implied by law, whether printed in the contract or not.

Those requirements which it would be difficult or impossible for the company to prove had not been complied with, were omitted altogether. That, for example, which states that the policy shall be void if the building be unprovided with good and substantial brick or stone chimneys has been omitted. It would be difficult to disprove a dishonest claimant's statement that his chimneys were all that had been required. Indeed, a learned and ingenious judge held, in one case, that a building which had one good and substantial brick or stone chimney could not be held to be unprovided with those useful articles, even though every other chimney in the building had been constructed of mud and sticks.

The clause requiring notice to and consent of the company for other insurance has been framed to meet decisions of the Courts in two well known cases, to the effect that a subsequent policy containing the same clause, viz., requiring notice of existing insurance, would be void *ab initio* by reason of the neglect, willful or otherwise, of the assured to give such notice, and, therefore, would not be "other insurance," and not sufficient to invalidate the first policy. We all know that the underwriter objects to over-insurance only because of the temptation it offers to an assured to burn his property for gain. In other respects, where it does not lead to a fire, it is an advantage to the underwriter, as it tends to diminish his loss. It is because of the incentive to fraud which it offers that it is objectionable, and it is not the less so if the assured supposes the insurance to be valid and collectible.

Says a learned writer on this subject: "The *spirit* of the condition is, therefore, violated, whether the second policy is void or valid, whenever the insured supposes it to be good, and this he must always suppose or he would not pay the premium to procure it."

It was reserved, at last, for a judge in the state of Iowa—all honor to his intelligence—to rebuke the impudence of this plea, and to remind the ingenious attorney making it that the law did not countenance such a monstrous injustice as that of permit-

ting a wrong-doer to take advantage of his wrong; to remind him that if the policy was void by reason of his wrong-doing he was not the proper one to plead its avoidance, and could have no standing in court for such a purpose; that, on its face, the policy was a valid one, and that, until the company issuing it chose to plead its invalidity, it was a valid instrument in the eye of the law, and the holder of it was estopped from pleading its invalidity.

To prevent any doubt on this point, the clause as to other insurance was made to read as follows: "If the assured now has or shall hereafter make or procure any other contract of insurance, *whether valid or not*," etc.

The aim has been, in short, to make a form of policy as brief as is consistent with safety, believing that by a shorter form in plain long primer type—the font prescribed by law in one of the States—substantial justice will be oftener secured before prejudiced juries than with longer and more explicit forms.

We should approach the task of making a contract, in the good faith of which the households and commerce of a continent repose, with a proper appreciation of the importance of the undertaking—with something more than a sense of duty to ourselves only. We know that those who accept our policies have rights as well as we, and they expect that we will secure their rights while we protect our own. We know that while many of them never read our policies because of the time and trouble it requires, there are not a few who neglect this precaution because they have faith in our fair dealing and confidence in our rectitude. Let us remember that he who draws a contract for his neighbor and himself should protect that neighbor not less than himself. Finally, not only in the form of our contract, but in the adjustment of losses under it and in the conduct of our business generally, let us continue to deserve that ancient and honorable reputation for fair dealing and "uniform practices" for which our profession, as a whole, has ever been distinguished; and, in the words of the great Apostle, in his letter to the people of that eternal city which gave to the world the Justinian Code, one of the great corner-stones of the English law and of our own, let us "Provide things honest in the sight of all men!"

DOES THE NEW YORK STANDARD POLICY LAW PROHIBIT THE USE OF CLAUSES OR FORMS WHICH HAVE NOT BEEN FILED WITH THE INSURANCE DEPARTMENT?

It has been claimed by many that, under the law of the State of New York, only those forms that have been filed with the Superintendent of Insurance can be used in any case. While I differ from this view, the companies generally would prefer to take the ruling of the Attorney-General and the Superintendent of Insurance, and it would probably be safest to do so. My own recollection is (for I was a member of the Commission which framed the Standard Policy) that the various forms for endorsements, etc., were filed as surplusage, and I have never regarded them as required to be filed by law. Even if they had been, I contend that the phraseology of the law and of the Standard Policy itself would admit of other forms better suited to meet the requirements of any particular case, and especially if in the interest of the property-owner.

Chapter 513 of the Insurance Law of 1901 provides that "No fire insurance corporation, its officers or agents, shall make, issue or deliver for use any fire insurance policy, or a renewal of any such policy, on property in this State, other than such as shall conform in all particulars, as to blanks, sizes of type, context, provisions, agreements and conditions with such printed blank form of contract or policy, and no other or different provision, agreement, condition or clause shall be in any manner made a part of such contract or policy, or endorsed thereon or delivered therewith, except as follows:

First. Name of corporation, etc.

Second. Printed or written forms of description and specification or schedules of the property covered by any particular policy, and *any other matter necessary to clearly express all the facts and conditions of insurance on any particular risk*, not inconsistent with or a waiver of any of the conditions or provisions of the Standard policy herein provided for."

The law of 1901 is a re-enactment of the law of 1886, with the exception of a clause which provided for transferring from the office of the Secretary of State to the office of the Superintendent of Insurance the standard forms, &c., that had been filed in the

first named office, "together with such provisions, agreements or conditions as may previous to the thirty-first day of December, 1901, be filed by the New York Board of Fire Underwriters in the office of the Superintendent of Insurance and approved by him, which provisions, agreements or conditions shall be void if they are inconsistent with the Standard fire insurance policy heretofore filed in the office of the Secretary of State."

It must be conceded that it would be impossible at any fixed date to conceive of forms which would, thereafter and for all time clearly express all the facts and conditions of insurance of particular risks, for new risks and new conditions are continually arising, and the law evidently contemplated that such must be provided for, stipulating only that such conditions should not be inconsistent with or a waiver of the standard form. In short, the law contemplated that the necessities of commerce, agriculture and business generally should be met by clauses which would clearly describe conditions which underwriters might be willing to assume, not inconsistent with the standard policy.

That the standard policy itself contemplates such conditions is plain from its own provisions. In line 11, for example, of the clause which provides for acts or laches of the assured which would void the policy, it is contemplated that the company may provide by agreement endorsed on the policy for exceptions it may be willing to make as to this clause. The language is as follows: "This entire policy, *unless otherwise provided by agreement indorsed hereon or added hereto*, shall be void," &c. It is plain that the Legislature and the framers of policy contemplated enlarging the policy in the interest of the property-owner as occasion and justice might require.

Provision was also made in lines 56, 57, 58 and 59 as follows:

"If, with the consent of this company, an interest under this policy shall exist in favor of a mortgagee or of any person or corporation having an interest in the subject of insurance other than the interest of the insured as described herein, the conditions hereinbefore contained shall apply in *the manner expressed in such provisions and conditions of insurance relating to such interest as shall be written upon, attached or appended hereto*," it is clear, therefore, that conditions other than those of ownership may be provided for by conditions

written upon, attached or appended to the policy. A clause providing that the loss, if any, shall be payable to a party as mortgagee, "or his assigns," would clearly be in line with this provision of the policy, and not a waiver of its conditions, for the conditions themselves contemplate providing for specific interests of payees; and, moreover, a contract between an insurance company and a mortgagee of insured premises touching the interest of the mortgagee therein is an independent and collateral agreement, according to the late Mr. William Allen Butler. Mr. Butler was the counsel of the commission that prepared the standard policy and so-called standard clauses. In a letter written January 10th 1898 he says:

"As the law expressly permits conditions as to particular risks not inconsistent with or a waiver of any of the provisions or conditions of the Standard policy, and the mortgagee clause is an *enlargement thereof for the benefit of the mortgagee*, it may be written according to the particular terms agreed upon, which in general are well expressed by the clauses formulated by the framers of the New York Standard Policy and filed with the Insurance Department *as customary clauses in general use, not as binding forms.* If the New York law *had required all clauses and conditions* inserted in the policy to be formulated, and a mortgagee clause had been so formulated, its use would be binding on the insurance companies; but *it makes no such requirement.*"

In the concluding paragraph of the letter of Attorney-General O'Brien of Sept. 13, 1887, replying to letter of Mr. E. R. Kennedy, Chairman of the Committee on Laws and Legislation of the New York Board of Fire Underwriters,* of August 31, 1887, is the following:

"I am of the opinion that fire insurance companies should conform to the letter of the statute and that they issue none other than the standard clauses, although others may cover substantially the same condition as those incorporated in the standard clauses, *unless there is some particular feature about the policy which is in no way inconsistent with the provisions of the standard policy, which facts may be added to the regular form of the standard policy.*"

*Mr. Kennedy was, also, Chairman of the Commission which framed the Standard Policy.

The law did not require the filing of standard forms and clauses for all conditions and hazards that might arise; that, for example, of abnormally powerful electric currents passing through dynamos or other electrical apparatus. No provision could contemplate and provide for the various hazards which would arise from time to time, and which, in the interest of the community as well as of the underwriters, would need to be provided for in the policies. Therefore, the mere filing of those forms which, at the date of filing, were supposed to be necessary could not be held to preclude the use of forms which might afterwards be found necessary in order to protect the companies and the community from dangers which would arise from time to time by discoveries in manufactures, chemistry, etc.—new explosives, for example.

I respectfully submit that the Attorney-General and the Superintendent of Insurance are mistaken in holding that the filing of particular forms or clauses precluded the companies from using any other matter necessary to clearly express all the facts and conditions of insurance on any particular risk. In lines 98, 99 and 100 of the Standard Policy the following words clearly contemplate the use of clauses which would thus apply, to wit: "*The extent of the application of the insurance under this policy or of the contribution to be made by this company in case of loss may be provided for by agreement or condition written hereon or attached or appended hereto.*"

And if any doubt could remain as to the right of companies thus to provide for contingencies whose hazards they were unwilling to assume, it would seem that such doubt would be removed by the concluding paragraph of the Standard policy, as follows:

"This policy is made and accepted subject to the foregoing stipulations and conditions, *together with such other provisions, agreements or conditions as may be endorsed hereon or added hereto*, and no officer, agent or other representative of this company shall have power to waive any provision or condition of this policy *except such as by the terms of this policy may be the subject of agreement indorsed hereon or added hereto*, and as to such provisions and conditions no officer, agent

or representative shall have such power or be deemed or held to have waived such provisions or conditions *unless such waiver, if any, shall be written upon or attached hereto.*"

Thus the policy, by line 11, by lines 56, 57, 58 and 59, lines 98, 99 and 100, and the important paragraph with which it terminates, clearly contemplates specific conditions necessary to describe the risk and the conditions which the company assumes, or is unwilling to assume; and the insertion of such conditions cannot possibly be regarded as inconsistent with or waiver of the conditions of the Standard policy while these provisions cited remain a portion of it. How can a clause or agreement endorsed on a policy or attached thereto be "inconsistent" with the "conditions or provisions of the Standard Policy" if it be endorsed in the manner prescribed by the Standard Policy itself, for just such purposes and "to express all the facts and conditions of insurance on any particular risk?"

To hold that property-owners engaged in commerce and manufactures cannot secure insurance on terms of contract mutually satisfactory to the insurance companies and themselves and, at the same time, not contrary to public policy or prejudicial to the rights of others, and that they are limited to forms of contract framed at a date when no human foresight could possibly have contemplated subsequent discoveries and processes, would be to assume that the Legislature intended to make no provision for growth and, therefore, was willing to cripple enterprise in all lines of human effort; for insurance against disaster is necessary for all business enterprise. That the Legislature in framing the Standard conditions did not contemplate such a cast-iron policy is evidenced by the liberal and elastic paragraphs of the Standard Policy itself above quoted.

FORMS FOR POLICIES, ENDORSEMENTS, TRANSFERS, ASSIGNMENTS, ETC., ETC.

NOTE.—For full instructions as to the writing of policies, see pages 287 to 307.

The following general forms will be found convenient for making transfers, assignments, etc.

I have not given much space to specific forms for insuring buildings and their contents, as most companies furnish these in printed blanks for attaching to policies.

Average clauses, co-insurance clauses, etc., vary, one State with another, by reason of legislation and adopted forms approved by the Insurance Department. New Jersey has a separate co-insurance clause, New York another. I regard the clause of the National Board of Underwriters as the best average or co-insurance clause, and next to this the standard clause of New York State.

There could be no better evidence of the unwisdom of prohibiting co-insurance, or stipulating that an exact form shall be followed by a State (unless, indeed, an ideally correct form could be agreed upon), than in the State of New Jersey, which provides a clause which cannot be departed from. The consequence is that underwriters who would be quite willing to insert the five per cent waiver clause as to inventory and appraisal in the case of small losses (which forms a part of the New York clause and which property-owners in New Jersey might well wish inserted) cannot give their customers the benefit of the clause because of the statutory prohibition.

The following forms were prepared by the committee of the National Board, of which the writer was chairman. As the National Board has no authority to require that they shall be used, their use is optional, and I print them here because they were carefully considered, and in the absence of any form required by State legislation they would probably be better for the company and the assured than any framed less carefully.

The following is the report of the Committee:

They have endeavored to keep in mind the various decisions of the higher courts, adopting in all cases phraseology whose interpretation seems to be well settled by the courts. In order to reach a correct opinion, they have secured from the various insurance associations throughout the country the forms adopted by them, with their explanation of preference for particular phraseology.

They have, as a rule, avoided wherever possible the phrase "it is understood and agreed," as admitting of evidence in case of litigation to disprove the statement, and have instead used the phraseology "it is a condition of this contract," or "it is expressly stipulated and made a condition of this contract," etc. In the case of occupancy, the phrase "while occupied for" has been taken in preference to the phrase "privileged to be occupied for."

The lightning clause recommended precludes all possibility of claim for electrical damage to dynamos, wiring or other electrical appliances, in order that the ordinary lightning clause attached to policies covering buildings containing dynamos and other electrical appliances should not subject the companies to claim for a loss which was not contemplated.

Cold Storage Clauses—The Committee found the conditions of the situation with regard to cold storage to be manifold. First, the companies are divided into two classes, those who are willing to assume only the direct fire loss and are unwilling to cover the indirect or consequential loss due to a change of temperature by interruption of process, some of this class of companies holding that they have no right under their charter to assume the indirect or consequential loss, especially where the interruption of process is by a fire occurring outside of the premises, as where a distant plant is burned. Second, those companies who are willing, for an extra premium, to assume the consequential loss or damage.

The warehouse men—or at least most of them—desire insurance covering this consequential damage in order that they may, in securing loans from banks give the policies as collateral security, the banks being unwilling to accept as collateral a policy which excludes consequential damage, which may involve the entire value of the merchandise.

Again, the warehouses seem to be divided as fire risks into no less than five classes or kinds, viz.:

1. Those having the refrigerating or cooling plant in the building itself, in which case it would be difficult to draw the line between the actual fire damage and a direct damage of increased heat caused by combustion of merchandise, as compared with the indirect damage from the rising of temperature owing to the interruption of the refrigerating process.

2. A warehouse having its cooling process or plant outside of the main building, under control by the owner, as where it might be adjoining and thoroughly cut off by a fire wall.

3. A warehouse—one of a number or system—supplied by a central plant located, perhaps, at a distance of blocks from some of the warehouses protected.

4. A warehouse, one of a system, supplied by duplex plants, either or both of which might be fireproof, and so reasonably assured against interruption of process with duplex systems of pipes.

5. A warehouse distant from the supplying plant, but with pipes connecting it passing through other hazards, some of them special hazards, and liable to be interrupted or cut off by a fire in any one of the intermediate buildings.

It seemed clear to the Committee that their duty was only twofold:

(A) That of preparing a clause which should especially except any claim for consequential damage, although this damage would probably be excepted under the standard policy without any special clause or notice.

(B) A clause assuming the consequential damage, for which a charge should be made; this charge or rate to be determined by the rating organization, like the New York Fire Insurance Exchange, Boston Board or others, which would certainly name a rate measuring each of the five conditions above named.

It is probable that a company would assume the additional hazard for an additional premium, and therefore use the clause B. But it is also possible that in the case of a warehouse system supplied by duplicate fireproof plants, for example, the owner might object to paying the rate charged for the possibility of interruption and assume this himself, in which case he would want the policy without the consequential clause at the rate fixed for it. It is clear he should have this choice if he can find companies to insure him on such a basis.

The problem is a complex one and, while possibly easily understood, requires care on the part of the companies. Those who insure the direct fire loss and exclude the consequential or indirect damage are liable to have trouble in case any company should assume both the fire loss and the consequential damage in the same warehouse, as perplexing distribution questions would arise in case of loss.

The Committee felt that it was necessary to enumerate the various buildings in which fires would occasion a loss under a policy covering the one insured, inasmuch as consequential damage in a building resulting from the destruction by a fire outside of the building would not be covered unless the policy assumed liability for fires outside the building containing the merchandise insured, and they felt it would be too indefinite to have the form read "by loss resulting from fire in the above described building or outside of said building." Therefore, the specific naming of all locations whose fires would involve a loss claim is deemed by the Committee necessary to insure that the policy would cover such outside fire and at the same time insure that the company should have notice of any change in hazard by changing the supply pipes to run through other buildings than those named, and thus subject the company to additional hazards not contemplated when taking the insurance.

It is important that two sets of policies should be written, so as to prevent complications arising out of non concurrence and questions of contribution. The companies assuming the fire risk only should except, by form "A," the liability for the indirect or consequential damage. For the same reason, the companies assuming the indirect or consequential damage alone should except the fire hazard, so that they could not be called upon to contribute for the indirect fire loss. Only in case all of the companies insuring the property assume both fire hazard and indirect or consequential hazard should the two hazards, the fire and the consequential, be written on the same policy.

It is obvious that in cities where a refrigerating plant, whether single or duplex, supplies a large number of risks (in one instance in New York 84 different buildings are so supplied) a company should know the facts in order that it may not have an excessive line by a single fire. A company having $10,000 in each of the twenty cold storage stores supplied by a burned plant would be confronted with claims for $200,000 by the burning of such plant.

The question, therefore, is not merely one of rate, which might involve charging in addition to the rate of the warehouse containing the property the rates of all other risks whose burning would cause an indirect or consequential damage, but is also one of line. Those companies who assume the consequential damage will need to be very careful as to this point.

At the last Annual Meeting of the Board, held in May, 1902, the Committee was authorized to promulgate the forms which had been submitted for the consideration of the Board and referred to the Committee witn power. The following are such clauses and forms.

NATIONAL BOARD STANDARD FORM No. 1.

TELEPHONE FORM.

On machinery, apparatus, tools and implements, cables, wires and cords, furniture and fixtures, printed and blank books and stationery, material and supplies, their own or held by them in trust, or on commission or leased, for which the assured may be legally liable, or sold but not delivered, all while contained in or on the telephone exchange stations hereinafter more specifically mentioned and described, and not to exceed in amount the sums set opposite each place or locality.

(Here follows description of the places and amounts covered.)

This company shall not be liable for any loss or damage resulting from any electrical injury or disturbance, whether from artifical or natural cause, in or to any of the property hereby insured, unless fire ensues, and then for the loss resulting from fire only. Nor shall this company be liable for any greater proportion of any loss than the amount hereby insured at each place bears to....per cent. of the actual cash value of the property insured at such place.

It is further understood and agreed that, in case of any loss or damage by fire, the assured is at liberty to make immediately all necessary repairs, notice of such loss to be given to this company without delay.

Attached to and made a part of Policy No....of................Insurance Company.

NATIONAL BOARD STANDARD FORM No. 2.

AVERAGE CLAUSE.

It is expressly stipulated and made a condition of this contract that this company shall be liable for no greater proportion of any loss than the amount hereby insured bears to....per cent. of the actual cash value of the property described herein at the time when such loss shall happen, nor for more than the proportion which this policy bears to the total insurance thereon; provided, however, that if the aggregate claim for any loss shall not exceed five (5) per cent. of such actual cash value, no special inventory or appraisement of the undamaged property shall be required.

If this policy be divided into two or more items, the foregoing conditions shall apply to each item separately; and if two or more buildings or their contents be included in a single item, the application of the provision as to special inventory or appraisement shall be limited to each building and its contents.

Attached to and made a part of Policy No....of................Insurance Company.

NATIONAL BOARD STANDARD FORM NO 3

REDUCED RATE AVERAGE CLAUSE.

In consideration of the reduced rate at which this policy is written, it is expressly stipulated and made a condition of this contract that this company shall be liable for no greater proportion of any loss than the amount hereby insured bears to. . . .per cent. of the actual cash value of the property described herein at the time when such loss shall happen, nor for more than the proportion which this policy bears to the total insurance thereon; provided, however, that if the aggregate claim for any loss shall not exceed five (5) per cent. of such actual cash value, no special inventory or appraisement of the undamaged property shall be required.

If this policy be divided into two or more items, the foregoing conditions shall apply to each item separately; and if two or more buildings or their contents be included in a single item, the application of the provisions as to special inventory or appraisement shall be limited to each building and its contents.

Attached to and made a part of Policy No. . . .of. . . . . .Insurance Company.

NATIONAL BOARD STANDARD FORM NO. 4.

COLD STORAGE CLAUSE "A."

This insurance is against only direct loss or damage by fire, and does not cover any loss or damage caused by change of temperature resulting from the total or partial destruction or disablement by fire or lightning of the cooling or other apparatus, connections or supply pipes, nor by the interruption of the cooling or other processes from any cause.

Attached to and made a part of Policy No. . . .of. . . . . .Insurance Company. (See pages 568, 569, &c.)

NATIONAL BOARD STANDARD FORM NO. 5.

COLD STORAGE CLAUSE "B."

This insurance being otherwise against only direct loss or damage by fire, in consideration of \$. . . . . . . .additional premium this company also assumes liability (not exceeding the amount of this policy remaining after the liability of this company for any direct loss or damage has been determined) for any loss or damage to the property described while contained in the above-named building, caused by change of temperature, resulting from the total or partial destruction or disablement of the cooling apparatus, connections or supply pipes by fire occurring in the above-described building, or in any other of the following buildings.

(Here name the location of the refrigerating plant and any other building through which the supply pipes pass, and which, if burning, might disable them)

Attached to and made a part of Policy No. . . .of. . . . . .Insurance Company. (See pages 568, 569, &c.)

National Board Standard Form No. 6.

RENT CLAUSE.

$....On the rents of the...............story building, situated and known as No...

The intention of this insurance is to make good the loss of rents caused by fire or lightning, actually sustained by the assured on occupied or rented portions of the premises which have become untenantable, for and during such time as may be necessary to restore the premises to the same tenantable condition as before the fire; said time, in case of disagreement, to be determined by appraisement in the manner provided in the conditions of this policy; but this company shall not be liable for a greater proportion of any loss than the sum hereby insured bears to the actual annual rental of such occupied or rented portions of the premises.

Attached to and made a part of Policy No....of................Insurance Company.

National Board Standard Form No. 7

LIGHTNING CLAUSE.

(EXCLUDING DAMAGE TO ELECTRICAL APPARATUS.)

This policy shall cover any direct loss or damage caused by lightning (meaning thereby the commonly accepted use of the term "lightning" and in no case to include loss or damage by cyclone, tornado or windstorm) not exceeding the sum insured nor the interest of the insured in the property and subject in all other respects to the terms and conditions of this policy; provided, however, that if there shall be any other insurance on said property this company shall be liable only pro rata with such other insurance for any direct loss by lightning, whether such other insurance be against direct loss by lightning or not; and provided further that, if dynamos, wiring, lamps, motors, switches or other electrical appliances or devices are insured by this policy, this company shall not be liable for any loss or damage to such property resulting from any electrical injury or disturbance, whether from artificial or natural causes, unless fire ensues, and then for the loss by fire only.

Attached to and made a part of Policy No....of................Insurance Company.

National Board Standard Form No. 8.

ELECTRICITY CLAUSE.

The use of electricity for light, heat or power is prohibited, unless a certificate shall have been issued by...............(here name the representative of Underwriters having jurisdiction) that the wiring and equipment are in full compliance with the requirements of the National Electric Code.

No alteration shall be made in the equipment after certificate is issued without written approval from said ....

Attached to and made a part of Policy No....of................Insurance Company.

NATIONAL BOARD STANDARD FORM No. 9.

LUMBER CLEAR-SPACE CLAUSE.

It is a condition of this contract that a continuous clear space of.......feet shall be maintained between the property hereby insured and any wood-working establishment or dry kiln, otherwise this policy shall be void; this does not prohibit the transportation of lumber or timber products across such clear space.

Attached to and made a part of Policy No....of................Insurance Company.

NATIONAL BOARD STANDARD FORM No. 10.

MILL YARD LUMBER CLAUSE.

It is a condition of this contract that a continuous clear space of.......feet shall be maintained by the assured between the property hereby insured and any wood-working establishment or any dry kiln (except tramways upon which lumber is not piled) and that such space shall not be used for the piling of lumber or timber products, but this shall not be construed to prohibit loading or unloading within, or the transportation of lumber and timber products across such clear space; otherwise this policy shall be void.

Attached to and made a part of Policy No....of................Insurance Company.

NATIONAL BOARD STANDARD FORM No. 11.

SPRINKLER CLAUSE

This policy being written at a rate based on the protection of the premises by the sprinkler system, it is a condition of this policy that, in so far as the sprinkler system and the water supply therefor are under the control of the assured, due diligence shall be used by the assured to maintain them in complete working order, and that no change shall be made in the said system or in the water supply therefor without the consent of this company in writing; otherwise this policy shall be void.

Attached to and made a part of Policy No....of................Insurance Company.

Copies of these forms may be procured by addressing H. K. Miller, General Agent, 32 Nassau Street, New York.

CO-INSURANCE OR AVERAGE CLAUSE.

It has always been a condition of marine insurance, as it should always have been a condition of fire insurance, that the principle of average or co-insurance should apply in determining the amount to be paid in case of loss. It would be as unjust to insure the properties of two owners, at the same rate, the one

insuring for 50% and the other for 100%, as to assess the values of their properties for the purposes of municipal or State taxation on different percentages of value.

The old French co-insurance clause read as follows:

"If, at the time of the fire, the value of the objects covered by the policy is found to exceed the sum total of the insurance, the assured is considered as having remained his own insurer for that excess, and he is to bear, in that character, his proportion of the loss."

The German clause was as follows:

"If, in case of loss, the insured objects should exceed the sum insured, and they should be partly saved, the assured will be considered as self insurer for the excess, and is to bear his share of the loss pro rata."

These two clauses met the issue squarely and left no room for mistake as to what was intended; but after the slipshod American methods of nearly a century of insurance it is doubtful if the use of these clauses, which were perfectly proper and straightforward, would be accepted without the criticism of placing a portion of the burden of insurance upon the policy-holder, overlooking the fact that if his rate is graded according to the amount that he carries, there is no more reason why he should complain than in the case of goods purchased at retail as compared with wholesale prices.

The following are the forms of co-insurance clause of New York State.

New York Standard, Average Clause.

This Company shall not be liable for a greater proportion of any loss or damage to the property described herein than the sum hereby insured bears to........per centum (......%) of the actual cash value of said property at the time such loss shall happen.

If the insurance under this policy be divided into two or more items this Average Clause shall apply to each item separately.

New York Standard, Average Clause.

With Exemption of Special Inventory or Appraisement in Certain Cases.

This Company shall not be liable for a greater proportion of any loss or damage to the property described herein than the sum hereby insured bears to........per centum (......%) of the actual cash value of said property at the time such loss shall happen.

In case of claim for loss on the property described herein not exceeding five per cent. (5%) of the maximum amount named in the policies written thereon and in force at the time such loss shall happen, no special inventory or appraisement of the undamaged property shall be required.

If the insurance under this policy be divided into two or more items these clauses shall apply to each item separately.

WAIVING SPECIAL INVENTORY AND APPRAISAL. It will be observed that the operation of the co-insurance clause is not waived by this form. It simply provides that in case the amount of loss under any item of the policy shall not exceed five per cent. of the total insurance no special inventory or appraisement of the undamaged property shall be required. This is a very different matter from waiving the operation of the co-insurance clause in toto.

A prominent insurance association authorized the following form:

"Provided, however, that if the aggregate amount of any loss shall not exceed five per cent. of the total cash value of any building and (or) its contents wherein such loss shall occur, *the application of the co-insurance clause shall be waived.*" (!)

In case of a fireproof building, insured for a very small percentage of its value, or in case of a policy covering a number of buildings, no two of which could burn together, insured only for the value of one of them, such a clause might have the effect of doing away with the co-insurance feature altogether.

This objectionable clause has been copied at various points throughout the country, and the greatest care should be observed by agents to see that such objectionable phraseology is not employed. It seems only fair to relieve the assured in the case of a large stock of merchandise, damaged for only a small percentage of its amount, from the labor of an inventory and appraisal on the whole stock, but out of the disposition on the part of underwriters to relieve the assured in such case has grown the phraseology which does away with the principle of co-insurance altogether.

Another important insurance association had the following clause:

"*This clause shall be inoperative* in the settlement of loss under any item of this policy when the amount of loss under such item or the total insurance thereon equals or exceeds the percentage above specified, or when the loss is less than five per cent. of the total insurance thereon."

It is to be hoped that the promulgation of the National Board form and the New York State Standard form will do away with these waivers of the entire clause.

These two clauses, both promulgated by intelligent boards of underwriters, emphasize the importance, already suggested, of the careful preparation and scrutiny of insurance forms. Some years ago an ingenious broker succeeded in placing insurance on a stock of fire-arms, cutlery, &c., with the following clause: "Privileged to keep gunpowder according to law and ball cartridges." It will be observed that the ball cartridges are well outside of the restrictions of municipal regulation.

Mr. J. T. Trezevant, of Dallas, Texas, has prepared a clever illustration of the fairness of co-insurance as follows:

"To write a blanket policy upon large manufacturing plants which are composed of divers risks without the co-insurance clause is the equivalent of assessing a tax on your largest buildings here in San Antonio at 30 per cent. of their value, while all other property in the city is assessed at 60 per cent. This discrimination, if made by your tax assessor, would be promptly corrected by the board of equalization; and yet by a singular paradox legislators who are insisting upon an equitable and equal assessment and collection of the fire tax have attempted in some states to force us to tax the poor man at double the rate that we tax the rich corporation. To show you how necessary it is to collect a tax based upon about approximately 80 per cent. of the value of the properties I will use an illustration which the insurance gentlemen present will understand, and which I hope will be perfectly clear to the laymen present.

Take 1000 detached frame dwellings worth $1200 each, and insured at $1000 each. The premiums at 1 per cent. would be $10,000. Experience in this South Texas field demonstrates that the loss would be approximately $6000, or 60 per cent. of the premiums. Going further into detail, the underwriter who is making the rates finds that at least 60 per cent. of this total amount comes from trifling losses that range from $1.00 to $150; that there will be two or three losses where the damage will be practically 50 per cent., or $500 each, and two losses where we will say the losses are total, $1000 each. We then have the figures:

2 total losses of $1000 each	$2000.
2 losses of 50 per cent., $500 each	1000.
50 losses in small amounts from $1 to $150	3000.

Now then let us suppose that some underwriter new to the business has entered the field, and has an opportunity to scoop this 1000 good detached dwellings. The owner has found out that most of his losses are small, and he concludes to take a small amount of insurance and no co insurance. The tyro in the business takes $500 insurance on each one of these 1000 dwellings at the same rate, 1 per cent., which would make his premiums $5000. The losses are the same as before. Let us see where each one of the underwriters will find himself. The figures in the last case would be as follows:

2 total losses, $500	$1000.
2 damage losses of $500 each (but as the policies are	

for only $500 each there are two total losses to the company under these policies)	1000.
50 losses same as in first example, being for small amounts	3000.
Total losses paid	$5000.

The result of this brilliant feat of underwriting, in which the underwriter insures only one-half the value of the property without co insurance, will be premiums $5000, losses to the insurance company $5000, and he is minus his expenses, which at 35 per cent. would amount to $1750. The company writing without the co insurance clause, or at half value, has made a loss of $1750, or about 35 per cent., but this loss does not fall upon the company. Every company recoups its losses by an increased assessment of tax in some other direction, and the result is that the neighbors of the man who had these 1000 dwellings are assessed to pay the $1750 losses made in handling his business, together with a small profit which is needed for the company to continue in business. Is it fair to the owners of property throughout the state, who have been mulcted to pay the loss on this individual because he was improperly assessed?"

The following illustration of President Evans of the Continental also shows how unfair is a policy without the co-insurance clause issued at the same rate as one containing the clause.

A and B each own a half interest in a building having a present structure value of $20,000. Each insures his half interest separately and in different companies; each company charges the same percentage or "rate" for insuring the property, and that "rate" is one per cent. or ten dollars for $1,000 of insurance. A insures his half in the Y company for $10,000 and pays for his policy $100. B insures his half in the Z company for $5,000 and pays for his policy fifty dollars. A fire occurs and the building is damaged $10,000 only. Company Y, insuring A, is called on to pay but fifty per cent. of the amount of its policy, while Company Z pays 100 per cent; and yet Company Y received twice as much premium as did Company Z.

DISTRIBUTION FORM OF THE AVERAGE CLAUSE.

It is sometimes impossible for the owner of property of a movable character, changing its location from day to day, and often from hour to hour in each day, as in the case, for example, of the product of a paper-mill, which in the morning may be in the paper machines at one end of the mill and by evening in the dryhouse, to accept insurance covering specifically. Under

such circumstances the distribution form of the average clause may be used, which practically secures specific insurance in that proportion which the insured would fix at the moment of a fire if he knew the value in each location. In short, the policy applies for such proportion of its amount in any one location as the value in such location bears to the value in all locations.

Of course, the full co-insurance clause, the insurance being equal in amount to the value of all of the property, no matter where located, would take care of the interest both of the assured and of the company, but the property-owner is not always willing to have a full co-insurance clause, and under the mistaken legislation of some States the use of any average or co-insurance clause is prohibited. The full co-insurance clause provides that whatever fraction or percentage of the value is destroyed that fraction of the insurance is payable. If one half the value is insured one half the loss is collectible of the insurance company. If the whole value is destroyed the whole insurance is collectible.

Let us suppose a merchant having goods stored in two different warehouses, A and B, so located relatively that they could not burn by one and the same fire. In "A" he has \$6,000 and in "B" \$3,000. If he should take out a policy of \$6,000 covering in both, without specific amounts and without the average clause, it is clear that the policy would effectually protect him, since a loss in either building would be covered by his insurance, and hence an insurance of \$6,000 would be almost as effectual as an insurance of \$9,000 written specifically, the only chance of his losing more than \$6,000 being in case both buildings should happen to burn at the same time. Any intelligent underwriter would decline to issue such a policy except at double the rate; but if the merchant should claim that he could not tell at any one time just what proportion of value would be in each warehouse and for that reason alone could not insure specifically, and is unwilling to pay for insurance in excess of two thirds ot the value, the "distribution form" of the average clause would adjust the matter so that the policy would cover in each in proportion as its value should bear to that in both. This would be better than a specific policy for his purpose and equally as fair for the underwriter, since its effect would be to distribute the insurance at the time of the happening of a fire so as to cover or apply in each warehouse in the proportion that

the value in such warehouse bears to the value in both. The insurance on this plan is thus made to follow the value, no matter how often it fluctuates.

Let us suppose the values, then, are $6,000 in "A" and $3,000 in "B" and that a fire occurs doing a damage in "A" of $4,000; as the insurance covers in this building in the proportion that its value ($6,000) bears to the value in both ($9,000), two-thirds of the insurance, or $4,000, would attach in "A" and in this case be sufficient to pay the loss.

Under the full co-insurance clause, by which the policy pays that proportion of the loss that the whole insurance ($6,000) bears to the whole value of the property ($9,000), or two-thirds, the owner would only receive two-thirds of his loss of $4,000, or $2,666.66.

The following diagram will serve to show the difference between the operation of the two forms of clauses.

UNDER DISTRIBUTION FORM.

Insurance applies $4,000 in "A" and $2,000 in "B."

In A—Loss of	$1,000.	In B—Loss of	$1,000.
Co. pays	1,000.	Co. pays	1,000.
Loss of	2,000.	Loss of	2,000.
Co. pays	2,000.	Co. pays	2,000.
Loss of	3,000.	Loss of	3,000.
Co. pays	3,000.	Co. pays	2,000.
Loss of	4,000.		
Co. pays	4,000.		
Loss of	5,000.		
Co. pays	4,000.		
Loss of	6,000.		
Co. pays	4,000.		

It will be noticed that as insurance covers $4,000 in A and $2,000 in B, the company never pays more than $4,000 in A nor more than $2,000 in B—no matter what the loss.

UNDER FULL CO-INSURANCE FORM.

Insurance being ⅔rds of value pays ⅔rds of any loss.

In A—Loss of	$1,000.		In B—Loss of	$1,000.
Co. pays ⅔	666⅔.		Co. pays ⅔	666⅔.
Loss of	2,000.		Loss of	2,000.
Co. pays ⅔	1,333⅓.		Co. pays ⅔	1,333⅓.
Loss of	3,000.		Loss of	3,000.
Co. pays ⅔	2,000.		Co. pays ⅔	2,000.
Loss of	4,000.			
Co pays ⅔	2,666⅔			
Loss of	5,000.			
Co. pays ⅔	3,333⅓.			
Loss of	6,000.			
Co. pays ⅔	4,000.			

It will be seen from this that the distribution form of the average clause would be more favorable to the assured than the full co-insurance clause.

If instead of the full co-insurance clause the 80% co-insurance clause is used the policy for $6,000 would pay such proportion of the loss $4,000 that $6,000 bears to $7,200 (80% of $9,000) or five-sixths of it, *i. e.* $3,333.33.

GRADED RATES FOR CO-INSURANCE.

I have always believed that it was a mistake to insist upon insurance to 80% of the value of property, because it antagonizes property owners and, therefore, legislators, who object to the compulsory rule and enact legislation prohibiting the use of the clause altogether. There is no reason why a rate cannot be graded according to the amount of insurance carried.

For a full explanation of the matter and the computation of the cost of insuring with varying percentages of insurance to value refer to "History and Analysis of the Universal Schedule." The percentages of losses are based upon actual experience through a series of years covering millions of dollars of losses and carefully tabulated by my own hand. I, therefore, feel able to vouch for the correctness of the tabulation. (See pages 709, 710 and 711.)

PRIVATE DWELLING FORM.

$........on ....story.............roofed Building, while occupied as a private dwelling with adjoining and communicating additions thereto, including foundations, piping, plumbing, fixed heating and cooking apparatus, and all irremovable fixtures, as a part of the building, situate...................

(Co-insurance Clause.)

Attached to and made a part of Policy No........of...........Insurance Company.

SPECIFIC FORM FOR FRESCOING AND MURAL DECORATIONS, etc., in expensive dwellings. I have already referred to expensive dwellings (see page 60) as one of the most uprofitable classes of risks at current rates. The small premium obtainable on a dwelling house policy makes the cost of thorough inspection an expensive percentage of the amount, and the careless underwriter is apt to write on a dwelling of this class in ignorance of the large values subject to damage by water and smoke in the shape of fresco-work on walls and ceiling, expensive wall hangings, tapestries, satin, etc. For this reason and, also, for the general reason that all insurance should be specific, it is best to write on the following form devised by President Evans of the Continental Ins. Co.

$5,000 On his four-story, brick building, while occupied as a private dwelling, and located at No. 503 Fifth Avenue, New York City.

This item does not cover frescoing, hangings or other wall coverings, tapestry or wood panelings on the walls or ceilings, in excess of ten per cent. of the amount of this policy; and it is a part of the consideration of this policy and the basis on which the rate of premium is fixed that no claim shall be made hereunder for loss on frescoing, hangings, tapestry or wood panelings on the walls or ceilings for an amount exceeding such ten per cent. of the total amount insured under this policy, unless the amount on such frescoing, hangings, tapestry or wood panelings be specifically mentioned herein, and then only for such specific amount.

In case insurance is desired on this damageable property in excess of ten per cent. of the amount of the insurance, it may be accepted under the following form and at double the rate:

$3,000 On frescoing, hangings, tapestry or other wall coverings or wood panelings on the walls or ceilings of the above described dwelling.

A rate fully twenty five per cent. higher should be fixed by the Local Board for the full form without specific amount on fresco-work and wall hangings and without the ten per cent. limit.

Nothing, it seems to me, could be fairer than this proposition,

for it prevents a necessarily high rate on all dwellings in order that companies may recoup themselves for the losses on dwellings which have such valuable furnishings the owners of which ought to pay for them. Under other conditions the policy-holders of moderate circumstances and simple tastes are obliged to pay a round rate to cover the losses of the rich. Not infrequently walls are covered with satin of the most delicate tints, put on the walls in plaits and folds, and in case of fire even an honest claimant, who might not have noticed before the fire the difference in color of the satin within the folds as compared with the faded material of the exposed surface, would claim and think that the damage had been done by smoke. Walls finished in this way are worth three or four times the rate of ordinary plain finish wall-paper dwellings. In one case coming to the writer's notice ten thousand dollars was paid for damage done to one room in an expensive dwelling. In another instance nine thousand dollars was paid for damage to wall hangings in the house of a wealthy New Yorker, caused by a small fire in the cellar, the smoke coming up the hot air flues and, as it was claimed, spoiling the lustre of the silk hangings.

It is best to decline to insure such buildings altogether, unless at rates which will pay for the hazard and with specific amounts named in the policy to define the limit of claim.

HOUSEHOLD AND KITCHEN FURNITURE.

$........on..........household and kitchen furniture and house furnishing goods, useful and ornamental; beds, bedding, linen, family wearing apparel, silver and plated ware; printed books and music; scientific and musical instruments, including stools and covers, sewing machines; (and, at not exceeding cost, on sculpture, mirrors, pictures, portraits, paintings and engravings, and their frames, watches and jewelry in use, curiosities and bric a brac,) crockery, glass and china-ware, fuel, family stores, bicycles, travelling and sporting equipments, articles of amusement and entertainment, and all articles generally used in housekeeping, the property of the assured or any member of the family, including guests and servants.

$....... on garden tools and implements, hose, lawn mower and awnings, all while contained in the..........story..........roofed building and adjoining and communicating additions while occupied as a private dwelling house and situate...

This policy does not cover any painting, tapestry, statuary or other work of art to an amount exceeding $500 unless specifically insured and then only to the extent of such specific amount,

$........on paintings, tapestries, statuary and other works of art, as per schedule hereto annexed, not exceeding the specific amount named on any one.

CO-INSURANCE CLAUSE,

This Company shall not be liable for a greater proportion of any loss or damage to the property described herein than the sum hereby insured bears to eighty per centum (80%) of the actual cash value of said property at the time such loss shall happen. In case of claim for loss on the property described herein not exceeding five per cent. (5%) of the maximum amount named in the policies written thereon and in force at the time such loss shall happen, no special inventory or appraisement of the undamaged property shall be required. If the insurance under this policy be divided into two or more items, these clauses shall apply to each item separately.

Attached to and made a part of Policy No.... ...of...........Insurance Company.

The above form has been made explicit in order to meet the mistaken views of many property-owners who suppose that an elaborate form of this kind is necessary to protect them. It is unnecessary to suggest to the underwriter, however, that, as a rule, short forms may be equally comprehensive and on some accounts preferable from the viewpoint of the assured. All of the items mentioned in the above form, for example, would be covered in the following:

$........On household furniture, wearing apparel, printed books and music, musical and scientific instruments, plate (and, at not exceeding cost, on pictures and their frames, sculpture, curiosities, watches and jewelry in use and bric a brac), family supplies, articles for amusement, entertainment and sport.

This policy does not cover any painting, tapestry or other work of art to an amount exceeding $500 unless specifically insured and then only to the extent of such specific amount.

$ ....On paintings, tapestries, statuary and other works of art, as per schedule hereto annexed, not exceeding the specific amount named on any one.

$........On garden tools and implements and awnings, all while contained etc., etc. (Co-insurance Clause.)

The phrases referring to kitchen and house furnishing goods are unnecessary; furniture is furniture, whether in the kitchen or parlor and whether it is "useful or ornamental"; silver and plated-ware are articles of furniture; piano stools, covers, sewing machines, mirrors, crockery, glass and china-ware are covered by the phrase "household furniture," and fuel and family stores would be covered by the phrase "family supplies." The assured might well object to having his policy cover the

wearing apparel and jewelry of his guests, since, unless he were over-insured, it would amount to his paying for such lost property out of his own pocket.

Paintings. Tapestries. Statuary. Curios. Works of Art. Etc. should be insured by schedule. with the cost of each, and a clause inserted that claim in case of loss shall not exceed cost, and the usual 80% co-insurance clause. If the limit of claim to cost cannot be secured the schedule is still preferable. It is much better to insure such works of uncertain value of this class by schedule than to insure them, as is generally done, by the usual household furniture form. In the latter case, if a damage should occur to a few paintings and none or very little to the furniture, the assured is tempted, if he be unscrupulous, to claim an excesssive value for these items, whereas if, in advance of a fire, he has knowledge that on every dollar of insurance specified he must pay a premium he is not likely to overvalue them, and the company will, in any event, secure a premium on the amount of insurance carried. Indeed, with an honest assured and an intelligent appraisal of values, there is less objection to a valued policy on property of this character than so often lies in the case of other property, and the company may consent to issue a valued policy upon full explanation and knowledge of the assured and the facts, having in mind the great difficulty of ascertaining a fair valuation after a fire and the tendency of juries to favor the assured and give him the benefit of any doubt even in cases of excessive value. It ought to be much easier to determine a fair value before a fire than after it.

There is a further advantage in having a schedule, and it is in the fact that it gives the insurance company an opportunity to know whether or not it is insuring articles of exceptionally large values, as otherwise it might be in ignorance. The assured, moreover, as already stated, is not likely to over-value his paintings when making up his schedule before a fire if he realizes that he will have to pay premium on each dollar of valuation—an important consideration.

Paintings of large value should be distributed among a number of companies, so that one does not have an excessive amount. An excess line might otherwise easily be assumed and the company subjected to a severe loss by a small burning in

the limited space of a picture frame. Excessive lines of this character are contrary to the principle of insurance, which is to distribute the risk so that a happening of a single contingency may not interfere with the principle of average. A small hole burned or punched in a valuable painting might ruin it, and there is the same objection to insuring a large amount on a single painting as in the case of insuring valuable animals; see page 515.

After the above had been set up, and before going to press, a fire occurred, on January 13th, in the dwelling of Mr. George Gould, in New York City, which so forcibly illustrates the importance of the suggestions that I state the facts here. The damage to an ordinary building would have been very slight; in fact, the loss was stated to be less than a thousand dollars. But after the fire, it was discovered that Louis XIV. tapestries, made in the seventeenth century, valued at $60,000, and a Van Dyke valued at $60,000, with portraits said to be worth $8,000, were destroyed in the hallway and on the line of the stairs.

It is probable that if Mr. Gould, instead of being insured on the blanket household furniture form, had been obliged to specify the amount on these valuable items he might have specified a smaller amount rather than pay the extra premium; or that he would have paid premium on the amount of insurance required.

Most property-owners would suppose that paintings hung in the hallway and on the line of the staircase could be easily removed; but most underwriters, knowing the drafts incident to staircases for fire and smoke, would have regarded them as particularly liable to destruction. It is said no water was thrown in this fire but only chemical extinguishers used.

Without the co-insurance clause in the case of a fireproof dwelling and short insurance, underwriters could easily make a total loss in a single room.

CHURCH FORM.

$........on..........story............roofed building, with..........spire or tower and adjoining and communicating additions, foundations and irremovable fixtures, including fixed heating apparatus and piping, while occupied as a place of public worship and known as ....

$........on..........organs with operating motor, pianos and other musical instruments while therein.

$........on..........church and other furniture and fixtures, useful and ornamental, vestments, chancel-rail, fonts, clock, bell, gas fixtures, chandeliers, (pictures, paintings, engravings with their frames, statuary, stained glass windows, altar vessels and other altar furniture, with frescoes on walls and ceilings,—value claim in case of loss not to exceed cost,) printed church and sunday school books, movable heating apparatus and fuel.

All while contained in the above described church building, with adjoining and communicating additions and situate................

....

$........other concurrent insurance permitted.

Attached to and made a part of Policy No........of...........Insurance Company.

To the Agent.—Churches have not been profitable risks owing probably to the frequency of fires caused by defective heating apparatus and the fact that they are usually lightly insured and nearly always total losses, there being no partition walls to check the progress of a fire once started. Examine carefully the heating apparatus (see instruction book page 441,) and report concerning same being sure also to state *proportion of insurance on each item to total value of same.* Local Boards should rate churches and other public buildings such as schools; court houses, etc., with and without the co-insurance clause. In absence of board rates this company will regard favorably at lower rates church and public building insurance, the co-insurance clause being attached to our policy.

A higher rate should be charged on a church with a spire or steeple, although it can seldom be secured. Underwriters frequently overlook the danger to church spires of stone, especially when carved, from fires in neighboring buildings. An entire stone spire might have to be taken down because of the combined effect upon it of water and heat from burning exposures.

All spires should be protected by lightning rods carried well into moist ground.

Stone columns in the interior of churches, so frequent in those of Gothic architecture, might result in the total destruction of a building supposed to be fireproof. There would be enough heat in the burning pews and floor boards to destroy stone piers and columns vitally important to the structure. Agents should look carefully to this matter. In fact, all stone columns carrying superimposed weights should have an interior cast-iron column of sufficient strength to carry the load.

There are probably few classes of risks so generally short insured as churches and schoolhouses, and rates should be graded

according to the amount of insurance carried, the best plan being, however, to have the 80% co-insurance clause on all church policies.

CHRISTMAS TREE FESTIVITIES. These add to the hazards of churches. The ignition of evergreen trees by lighted wax tapers is a danger always to be guarded against. A safer plan for lighting a Christmas-tree is by electric bulbs. Where a Santa-Claus personation is a feature of the entertainment the cotton or other fibre which is employed in his make-up should be first soaked in a strong solution of alum water or tungstate of soda, mixed one part of tungstate of soda to seven parts of water. (See page 546.) Every year Christmas festivities, in some section of the country or other, are marred by fatalities due to neglect of simple and inexpensive precautions.

LEASE CLAUSE.

$........on....lease of the..........story......... ..roofed building, privileged for hazardous occupation, situate....................................

Loss, if any, payable as per lease clause attached.

It is a condition of this insurance that, in case of such destruction by fire of the above-named premises the lease held by the assured shall be, by its terms and in fact, canceled, then this Company shall be liable to pay the whole amount hereby insured, less a deduction at the rate of.........(*here insert one-twelfth* ($\frac{1}{12}$), *or other proper proportion of the policy, according to its term and the value of the lease*) dollars per month, for such time as shall have elapsed between the date of this insurance and the happening of such fire.

MERCANTILE BUILDING FORM.

$........on..........story.................roofed building, with adjoining and communicating additions, including foundations and irremovable fixtures, while occupied as..
and situate ....

Attached to and made a part of Policy No........of........ ...Insurance Company.

MERCHANDISE FORM.

$....... on........Stock of Merchandise, consisting principally of.........
....
and all other goods, wares and merchandise not more hazardous kept for sale by assured, not specified in the foregoing, while contained in ....story...................roofed building and adjoining and communicating additions thereto, while occupied as................
and situate..

$........on Store and Office Furniture and Fixtures including Safe, Signs and Awnings, while contained in or on said building.

$........on..

$........on..

$........Other concurrent insurance permitted.

Restrictions as to lights. Keeping and Vending of Coal Oil. Gunpowder and Saltpetre. — The use, as a light, of Refined Coal Oil or Petroleum, of lawful fire test, is permitted. Merchants accustomed to deal in the articles are privileged to keep for sale......pounds of Gunpowder in close tin can, to be sold by daylight only, and......pounds of Saltpetre; also.....barrels of refined Kerosene, of lawful fire test, provided the same be not drawn by artificial light placed within the distance of ten feet thereof.

Attached to and made a part of Policy No........of............Insurance Company.

RE-INSURANCE FORM.

$........on a pro rata part of its liability as Insurer under its Policy No..... issued at its..................Agency, to and covering the property of...... ....for $............as follows, viz:

....

It is a condition of this re-insurance that if the re-insured policy is cancelled or reduced in amount, this policy shall be cancelled or reduced in like proportion, and that the re-insured Company is to retain at its own risk (exclusive of any and all re-insurance) under the policy hereby re insured an amount equal to the proportion which the amount of this policy bears to the amount of the particular policy hereby re insured at the date this re-insurance is effected.

It is further understood and agreed that such re-insurance is a pro rata part of each and every item insured by the policy of the re-insured Company, and is subject to the same risks, valuations, conditions and mode of settlement as may be taken or assumed by said re-insured Company, it being expressly agreed, however, that notice of any change in the risk or additional privilege granted shall be at once given to this Company. Loss, if any, payable at the same time and in the same manner and pro rata with amount paid by said re-insured Company. Other re-insurance permitted subject to the aforesaid conditions.

Attached to and made a part of Policy No........of............Insurance Company.

N. Y. & New Jersey Standard.

LIGHTNING CLAUSE.

This policy shall cover any direct loss or damage caused by Lightning, (meaning thereby the commonly accepted use of the term Lightning, and in no case to include loss or damage by cyclone, tornado, or wind-storm) not exceeding the sum insured, nor the interest of the insured in the property, and subject in all other respects to the terms and conditions of this policy. *Provided,*

however, if there shall be any other insurance on said property this company shall be liable only pro rata with such other insurance for any direct loss by Lightning, whether such other insurance be against direct loss by Lightning or not.

Attached to and made a part of Policy No........of............Insurance Company.

THREE-FOURTHS VALUE CLAUSE.

It is a condition of this insurance that, in the event of loss or damage by fire to the property insured under this policy, this Company shall not be liable for an amount greater than three fourths of the actual cash value of each item of property insured by this policy (not exceeding the amount insured on each such item) at the time immediately preceding such loss or damage; and in the event of additional insurance—if any is permitted hereon—then this Company shall be liable for its pro rata proportion only of three-fourths such cash value of each item insured at the time of the fire, not exceeding the amount insured on each such item.

Attached to and made a part of Policy No........of............Insurance Company.

THREE-FOURTHS LOSS CLAUSE.

It is a condition of this insurance that, in the event of loss under this policy, this Company shall not be liable for an amount greater than three-fourths of such loss (not exceeding the sum hereby insured), and, in the event of additional insurance permitted hereon, then this Company shall not be liable for an amount greater than its pro rata proportion of three-fourths of such loss; in both events the other one-fourth to be borne by the assured.

Attached to and made a part of Policy No........of............Insurance Company.

IRON SAFE CLAUSE.

WARRANTY TO KEEP BOOKS AND INVENTORIES, AND TO PRODUCE THEM IN CASE OF LOSS.

The following covenant and warranty is hereby made a part of this policy:

1st. The assured will take a complete itemized inventory of stock on hand at least once in each calendar year, and unless such inventory has been taken within twelve calendar months prior to the date of this policy, one shall be taken in detail within 30 days of issuance of this policy, or this policy shall be null and void from such date, and upon demand of the assured the unearned premium from such date shall be returned.

2d. The assured will keep a set of books, which shall clearly and plainly present a complete record of business transacted, including all purchases, sales and shipments, both for cash and credit, from date of inventory as provided for in first section of this clause, and during the continuance of this policy.

3d. The assured will keep such books and inventory, and also the last preceding inventory, if such has been taken, securely locked in a fireproof safe at night, and at all times when the building mentioned in this policy is not

actually open for business, or, failing in this, the assured will keep such books and inventories in some place not exposed to a fire which would destroy the aforesaid building.

In the event of failure to produce such set of books and inventories for the inspection of this Company, this policy shall become null and void, and such failure shall constitute a perpetual bar to any recovery thereon.

Attached to and made a part of Policy No........of............Insurance Company.

LOSS PAYABLE CLAUSE.

Loss, if any, under this policy shall be payable to.............Mortgagee, as his interest may appear but only as such loss shall be ascertained and agreed upon by the insured and this Company, and this clause is subject in all respects to the stipulations, provisions and conditions contained in this Policy.

Attached to and made a part of Policy No........of.......... .Insurance Company.

PERMIT TO SELL KEROSENE OIL.

Permission granted to keep for sale not exceeding.......... ....barrels of Kerosene or Illuminating Oil, which shall be of not less than the United States standard of 110°. Not to be handled or sold by artificial light within the distance of fifteen (15) feet.

Attached to and made a part of Policy No ....of........... Insurance Company.

TRANSFER FOR CHANGE OF LOCATION.

.....................................190

Permission is hereby given to remove the property insured under......... ....items of this policy to.......................... and for not exceeding..........days from date hereof this Policy shall attach in both locations in proportion as the value in each bears to the value in all, and after such......... days in new location only, and not as heretofore.

Rate increased to....%, additional Premium $......Rate reduced to.... % Return Premium $..........

Attached to and made a part of Policy No ....of...........Insurance Company.

To the Agent.—In making transfer refer to "first," "second," "third" or "all" items, as case may be, attach slip to regular endorsement report and to avoid correspondence be sure and limit, by wording the endorsement, the occupation of the buildings containing the property in the new location, giving particulars concerning new location, exposure, occupancy, etc. As a rule policies covering in a number of buildings (farm risks) should not be transferred but rewritten.

COMMISSION CLAUSE.

$........To cover merchandise, their own, or held by them in trust, or on commission, or sold, but not delivered (*do not use the word "removed."*)

OTHER INSURANCE.

$........other insurance, concurrent herewith, permitted.

NOTE.—Limit the amount of additional insurance, in every case—and all policies should be concurrent with the policy of this Company.

GUNPOWDER ON SALE.

"Privileged to keep on hand for sale in said building, not to exceed twenty-five pounds of gunpowder, the same to be kept in closed metal or earthen canisters, to be handled by daylight only."

NOTE.—The amount of gunpowder prescribed by law should never be exceeded.

CHANGE OF OWNERSHIP.

This Company hereby agrees to recognize....................as sole owner of the above-named property. Loss, if any, payable to him.

NOTE.—This may, also, be done by assignment on back of policy. See printed form.

ASSIGNMENT OF POLICY.

(See the printed form on the back of the policy itself.)

In reporting an assignment to the Company on the small blank provided for that purpose, it is not necessary to copy the whole printed form, but merely to state that policy has been assigned to the assignee, giving the name and interest of the latter. In all cases, *the interest of the assignee* should be stated in the report.

ASSIGNMENT AFTER A LOSS.

Do not consent to any assignment, or other change in a policy, *after a loss*. When a fire occurs, the policy should be permitted to remain exactly as it was before the loss.

BUILDINGS ON LEASED GROUND.

It is understood that the above-named building stands on leased ground, the lease having............years to run, (*always insert the number of years*), from ....190.. (*insert date of commencement.*) (See Page 59.)

ASSIGNMENT OF MORTGAGE INTEREST.

The interest of..........as mortgagee in this policy, having been assigned to...........consent thereto is hereby given, and loss, if any, payable to him as such assignee mortgagee.

FORM OF PERMIT TO KEEP FIREWORKS.

In consideration of $........additional premium (*charge 50 cents per $100 of insurance for every month, or fraction of a month*) permission is granted to keep fireworks for one month ending..... ....19...

PERMIT TO RUN MACHINERY EXTRA HOURS.

In consideration of $........additional premium, permission is granted to run the machinery extra hours, not later than......o'clock P. M., to even up work.

Where the machinery is run later than ten o'clock the time must be charged for, at the same rate as day work, although worth more on account of the danger from the carelessness of tired and sleepy employees.

Where manufactories (other than those in which night work is an incident of the process, such, for example, as rolling mills, blast furnaces, etc.) are run all night, double rates should be charged.

Certificate to be taken for a Policy lost or destroyed. *where no premium has been paid.*

ALBANY, N. Y., January 10th, 1903.

"This is to certify that policy No......renewal No......of the.......... Insurance Company of................issued to me at its agency at Albany, N. Y., on the stock of merchandise contained in the brick, metal roof building situate.... ...., cannot be found, and said policy and renewal are hereby declared to be null and void, the said Company being hereby released from all liability thereunder; and I further agree that, in case said policy and renewal should, at any time, be found they shall be forwarded to said Insurance Company, at its office in the city of New York, without any delay."

Certificate of Discharge for a Policy lost or destroyed. to be taken, in all cases, where it is necessary to cancel a policy *and to pay any return premium.*

ALBANY, N. Y., January 10, 1903.

"This is to certify that policy No......renewal No......of the........... Insurance Company of.................issued to me at its agency at Albany, N. Y., on the brick, metal roof building situate......................cannot be found, and, in consideration of the sum of Ten and $\frac{50}{100}$ dollars ($10.50) return premium to me paid, the receipt of which is hereby acknowledged, the said policy and renewal are hereby canceled in full, the said Company being released from all liability thereunder; and it is further agreed, that, in case said policy and renewal should be, at any time, found, they shall be, at once, forwarded to the office of the Company.

AWARD OF APPRAISERS.

We, the undersigned, appointed to appraise and estimate the actual damage to each article named in the schedule hereunto annexed, marked A, which was damaged or destroyed by fire on the..............day of..............190.., do hereby certify that we have truly and conscientiously performed the duty

assigned us, and have awarded as the actual cash value of and damage to each article the amount as therein set forth.

Witness,

....[L. S.]

PRINTED SLIPS AND FORMS.

Where a printed form is used, it should be signed by the agent and numbered to correspond with the policy, as follows:

"*Slip No*..........*attached to policy No*..........*of the*..............*Insurance Company.*"

........................*Agent.*

STRENGTH OF MATERIALS FOR BUILDING.

Beams. Girders. Columns or Pillars. Etc.

To determine the strength of materials for building is an important matter in construction, and while the ascertainment of rules involves considerable engineering knowledge, the application of those rules requires no more fitness for the task than every fairly educated mechanic possesses, with such text-books at his hand for reference as Trautwine or Haswell's Engineer's Hand-Book, Ganot's Physics, Molesworth's Engineering Formulae, etc., etc. Probably Trautwine's Engineering Pocket-Book would supply him with all the tables and explanations he would need. I shall not, for want of space, go much into detail as to computing strains or stresses, so-called, but content myself (and possibly my readers) with brief explanations of methods, definitions of terms and a few concise tables.

The "ultimate stress" or breakage or yielding point of a beam depends upon its area (usually expressed in square inches), its depth in inches, and its length between bearings or supports, (for convenience, also computed in inches) and also upon the material of which it is composed, viz., cast-iron, steel, wrought iron, oak, white pine, yellow pine, spruce, hemlock, etc., and on conditions, as of seasoning in wood, well seasoned wood being stronger than green.

The "ultimate" stress of a material is that which is just short of enough to break, crush or destroy it, and some smaller stress or load must be employed for safety by a fraction known as the "factor of safety."

By the "length" of a body is meant its dimension *in the line of the stress*, and by the "area" the area in square inches of the cross section strained, at right angles to the "length."

A stress is usually stated in pounds per square inch, and the number of pounds per square inch which short blocks of a given

material, iron or wood, will withstand is known as its "*constant*" or "*coefficient*" or "*modulus*," which when ascertained enables one to compute the "*ultimate*" stress, or breaking point, of any longer beam or pillar by ratio computation. The constant or coefficient of any material is, therefore, such number of pounds per square inch of short blocks, say 6 inches long, as is constantly used for computing its strength. The "stress" is usually expressed in pounds, the "stretch" and the "length" in inches, and the "area" in square inches. These are units adopted in all computations.

Stresses or strains are of various kinds, viz., the *compressive* strain, or that of resistance of a column or pillar from the base of its support to a superimposed weight; the *tensile* strain, or the operation of a force tending to tear or pull the particles of the tested beam apart, as when a piece of iron or wood suspended from a secure point has to support a weight at its other end; whereas the compressive strain or stress tends to push the particles of a body closer together, as where a superimposed weight presses a pillar against an immovable base; the *transverse* or *cross* strain, as in the case of a load on a beam, tending to bend it; the *torsional* strain, or twisting strain, as where two forces, called, in engineering parlance, "contrary couples" of forces acting on parallel lines but against each other, act upon it in different directions, as in the case of a ship's screw shaft, the steam acting in one direction and the resistance of the water in the opposite direction; and the *shearing* strain, as when acted upon by a force or weight tending to slide its particles over each other, as when a piece of wood, for example, supported at each end upon immovable supports, is acted upon by a weight so great as to push that portion between the two supports out of place, shearing it off, so to speak, by a transverse stress. It is of the same nature as the operation of a punch and die strain.

A beam or girder subjected to a stress shows a "deflection" and the limit of "elasticity" is that point at which it is liable to break and where the deflections are observed to increase perceptibly faster than the load. Hence the rule that the actual load must not only never exceed the elastic limit but should not exceed more than one-third or, at the most, one-half of it, under any circumstances. There are rules for computing deflection of beams, which may be found in Trautwine, Kidder, Moles-

worth, Haswell or other engineering books. Trautwine and Haswell are the ones usually preferred.

When a load or stress is removed the tendency of the beam is to recover its original shape, but there is apt to be a permanent bend, or what is known as the permanent "set." This, in fact, takes place in all cases of stress, even under moderate loads.

The elastic ratio, so-called, of material is ascertained by dividing the elastic limit by the ultimate strain, and is usually expressed in a decimal fraction.

It must be remembered that weights of the beam or of the materials themselves must be added to get the "neat" or "safe load"—usually adding one-half the weight of a beam, for example, the distributed weight of a beam being, like that of its distributed load, about one-half of its concentrated weight. The weight of materials may be such as, carried to a great height, would destroy themselves. Brickwork weighs 112 pounds per cubic foot, and as it would crush under thirty tons per square foot, a vertical column of it 600 feet high would crush under its own weight. (We may find some comfort as to sky-scraping buildings in this fact.)

The strength of material also depends upon conditions (such as dryness or degree of "seasoning" of wood—seasoned wood being stronger than green) and shape; a square post being stronger than a cylindrical one—in the case of wood, because of the greater area of cross section, while in the case of cast-iron, the cylindrical column is stronger, (with the same amount of metal) because there is less likelihood of defective castings, "floating cores," &c., in round castings than in square.

There is a great difference between the stress of a force or weight acting slowly and constantly as compared with one acting suddenly. A suddenly applied load would strain at least twice as much as the same weight at rest; and for this reason troops in crossing bridges are always required to "break step," and floors for dancing need to be stronger than for dormitories. Moreover, all materials constantly subjected to the same stresses become in time "tired," and at the end of a long series of stresses will yield to a smaller load than that which originally they could carry safely. Such facts have to be provided for. Wrought iron, for example, which carries as a "constant" 53,000 pounds

per square inch for 800 applications, broke at 35,000 pounds after ten million applications.

Iron caps for wooden pillars are admirable, but, as elsewhere stated, the weight should be carried by a pintle going through the girder or beam to the iron plate of pillar of the story above (see page 125), so that there shall not be shrinkable timber beams in the line of supports. As already stated, wood shrinks by the contraction of its cells and, therefore, horizontally, rather than vertically, and the shrinkage of four 12-inch beams would amount to the shrinkage of 48 inches of horizontal wood.

The following are the provisions of the New York Building Law as to weights of materials, computations of strength, factors of safety and working stresses:

Strength of existing floors to be calculated.

In all warehouses, storehouses, factories, workshops, and stores where heavy materials are kept or stored, or machinery introduced, the weight that each floor will safely sustain upon each superficial foot thereof, or upon each varying part of such floor, shall be estimated by the owner or occupant, or by a competent person employed by the owner or occupant.

Such estimate shall be reduced to writing, on printed forms furnished by the Department of Buildings, stating the material, size, distance apart and span of beams and girders, post or columns to support floors, and its correctness shall be sworn to by the person making the same,

And it shall thereupon be filed in the office of the Department of Buildings.

But if the commissioners of buildings shall have cause to doubt the correctness of said estimate, they are empowered to revise and correct the same, and for the purpose of such revision the officers and employes of the Department of Buildings may enter any building and remove so much of any floor or other portion thereof as may be required to make necessary measurements and examination.

When the correct estimate of the weight that the floors in any such buildings will safely sustain has been ascertained, as herein provided, the Department of Buildings shall approve the same,

And thereupon the owner or occupant of said building or of any portion thereof, shall post a copy of such approved estimate in a conspicuous place on each story, or varying parts of each story, of the building to which it relates.

Before any building hereafter erected is occupied and used, in whole or in part, for any of the purposes aforesaid, and before any building, erected prior to the passage of this Code, but not at such time occupied for any of the aforesaid purposes, is occupied or used, in whole or in part, for any of said purposes, the weight that each floor will safely sustain upon each superficial foot thereof, shall be ascertained and posted in a conspicuous place on each story or varying parts of each story of the building to which it relates.

No person shall place, or cause or permit to be placed on any floor of any building any greater load than the safe load thereof, as correctly estimated and ascertained as herein provided.

Expense for examining into strength of floors.

Any expense necessarily incurred in removing any floor or other portion of

any building for the purpose of making any examination herein provided for shall be paid by the Comptroller of The City of New York, upon the requisition of the Board of Buildings, out of the fund paid over to said board under the provisions of section one hundred and fifty eight of this Code. Such expenses shall be a charge against the person or persons by whom or on whose behalf said estimate was made, provided such examination proves the floor of insufficient strength to carry with safety the loads found upon them when such examination was made; and shall be collected in an action to be brought by the Corporation Counsel against said person or persons, and the sum so collected shall be paid over to the said Comptroller to be deposited in said fund in reimbursement of the amount paid as aforesaid.

Floor calculations filed with application to build.

When the architect of record for any building has filed with his application to build the data required to determine the strength of floors, on one of the blank forms provided for that purpose, such examination shall not be required provided that the purposes and uses of the building have not been changed.

Safe load for masonry work.

The safe-bearing load to apply to brickwork shall be taken at—

Eight tons per superficial foot when lime mortar is used;

Eleven and one half tons per superficial foot when lime and cement mortar mixed is used;

Fifteen tons per superficial foot when cement mortar is used.

Rubble-stone work.

The safe-bearing load to apply to rubble-stone work shall be taken at—

Ten tons per superficial foot when Portland cement is used;

When cement other than Portland is used, eight tons per superficial foot;

When lime and cement mortar mixed is used, seven tons per superficial foot;

And when lime mortar is used, five tons per superficial foot

Concrete.

The safe-bearing load to apply to concrete—

When Portland cement is used shall be taken at fifteen tons per superficial foot;

And when cement other than Portland is used, eight tons per superficial foot.

Weights of certain materials.

In computing the weight of walls,

A cubic foot of brickwork shall be deemed to weigh one hundred and fifteen pounds.

Sandstone, white marble, granite and other kinds of building stone shall be deemed to weigh one hundred and seventy pounds per cubic foot.

Computations for strength of materials.

The dimensions of each piece or combination of materials required shall be ascertained by computation, according to the rules prescribed by this Code.

Factors of safety.

Where the unit stress for any material is not prescribed in this Code the relation of allowable unit stress to ultimate strength shall be—

As one to four for metals, subjected to tension or transverse stress;

As one to six for timber,

And as one to ten for natural or artificial stones and brick or stone masonry.

But wherever working stresses are prescribed in this Code, varying the factors of safety herein above given, the said working stresses shall be used.

Strength of columns.

In columns or compression members with flat ends of cast iron, steel, wrought iron or wood, the stress per square inch shall not exceed that given in the following tables:

When the length divided by least radius of gyration equals	Working stresses per square inch of section		
	Cast iron.	Steel.	Wrought iron.
120	......	8,240	4,400
110	......	8,820	5,200
100	......	9.400	6,000
90	......	9,980	6,800
80	......	10,560	7,600
70	9,200	11,140	8,400
60	9,500	11,720	9,200
50	9,800	12,300	10,000
40	10,100	12,880	10,800
30	10,400	13,460	11,600
20	10,700	14,040	12,400
10	11,000	14,620	13,200

And in like proportion for intermediate ratios.

When the length divided by the least diameter equals	Working stress per square inch of section		
	Long leaf yellow pine.	White pine, Norway pine, spruce.	Oak.
30	460	350	390
25	550	425	475
20	640	500	560
15	730	575	645
12	784	620	696
10	820	650	730

And in like proportion for intermediate ratios. Five-eighths the values given for white pine shall also apply to chestnut and hemlock posts.

For locust posts use one and one-half the value given for white pine.

Columns and compression members shall not be used having an unsupported length of greater ratios than given in the tables.

Columns eccentrically loaded.

Any column eccentrically loaded shall have the stresses caused by such eccentricity computed, and the combined stresses resulting from such eccentricity at any part of the column, added to all other stresses at that part shall, in no case, exceed the working stresses stated in this Code.

The eccentric load of a column shall be considered to be distributed equally over the entire area of that column at the next point below at which the column is securely braced laterally in the direction of the eccentricity.

EXAMPLES.

What will be the safe load for a yellow pine post 10″ x 10″—10 feet in length?

Length in ins.
$$\frac{120}{10} = 12,$$ for which the working stress per square inch of section in the above table is 784
least diameter.

The sectional area of a 10″ x 10″ post is 100 square inches.

	Sectional area		Working stress.		
Therefore	100	x	784	=	78,400 lbs., or 39.2 tons, safe load.

What will be the safe load for a yellow-pine post 8″ x 10″—10 feet in length?

Length in ins.
$$\frac{120}{8} = 15,$$ for which the working stress per square inch of section in the above table is 730.
least diameter.

The sectional area of an 8″ x 10″ post is 80 square inches.

	Sectional area.		Working stress.		
Therefore	80	x	730	=	58,400 lbs., or 29.2 tons, safe load.

What will be the safe load for a round yellow-pine column 10″ dia.—10 feet in length?

Length in ins.
$$\frac{120}{10} = 12,$$ for which the working stress per square inch of section in the above table is 784.
least diameter.

The sectional area of a 10″ round column is 78.54 square inches.

	Sectional area.		Working stress.		
Therefore	78.54	x	784	=	61.575 lbs., or 30.79 tons, safe load.

Working stresses.

The safe carrying capacity of the various materials of construction (except in the case of columns) shall be determined by the following working stresses in pounds per square inch of sectional area.

Compression (Direct).

Rolled steel	16,000
Cast steel	16,000
Wrought iron	12,000
Cast iron (in short blocks)	16,000
Steel pins and rivets (bearing)	20,000
Wrought iron pins and rivets (bearing)	15,000

	With Grain.	Across Grain.
Oak	900	800
Yellow pine	1,000	600
White pine	800	400
Spruce	800	400
Locust	1,200	1,000

Hemlock	500	500
Chestnut	500	1,000

Concrete (Portland) cement, 1; sand, 2; stone, 4	230
Concrete (Portland) cement, 1; sand, 2; stone, 5	208
Concrete, Rosendale, or equal, cement, 1; sand, 2; stone, 4	125
Concrete, Rosendale, or equal, cement, 1; sand, 2; stone, 5	111
Rubble stonework in Portland cement mortar	140
" " " Rosendale cement mortar	111
" " " lime and cement mortar	97
" " " lime mortar	70
Brickwork in Portland cement mortar; cement 1—sand 3	250
" " Rosendale, or equal, cement mortar; cement 1—sand 3	208
" " lime and cement mortar; cement 1—lime 1—sand 6	160
" " lime mortar; lime 1—sand 4	111
Granites (according to test)	1,000 to 2,400
Greenwich Stone	1,200
Gneiss (New York City)	1,300
Limestones (according to test)	700 to 2,300
Marbles (according to test)	600 to 1,200
Sandstones (according to test)	400 to 1,600
Bluestone—North River	2,000
Brick (Haverstraw, flatwise)	300
Slate	1,000

Tension (Direct).

Rolled Steel	16,000
Cast "	16,000
Wrought Iron	12,000
Cast "	3 000
Yellow Pine	1,200
White "	800
Spruce	800
Oak	1,000
Hemlock	600

Shear.

Steel Web Plates	9,000
" Shop Rivets and Pins	10,000
" Field "	8,000
" " Bolts	7,000
Wrought Iron Web Plates	6,000
" " Shop Rivets and Pins	7,500
" " Field "	6 000
" " " Bolts	5,500
Cast Iron	3,000

	With Fibre	Across Fibre.
Yellow pine	70	500
White "	40	250
Spruce	50	320
Oak	100	600
Locust	100	720
Hemlock	40	275
Chestnut		150

Safe Extreme Fibre Stress (Bending).

Rolled Steel Beams	16,000
" " Pins, Rivets and Bolts	20,000

Riveted " Beams (Net Flange Section)	14,000
Rolled Wrought Iron Beams	12,000
" " " Pins, Rivets and Bolts	15,000
Riveted " " Beams (Net Flange Section)	12,000
Cast Iron Compression Side	16,000
" " Tension Side	3,000
Yellow pine	1,200
White "	800
Spruce	800
Oak	1,000
Locust	1,200
Hemlock	600
Chestnut	800
Granite	180
Greenwich Stone	150
Gneiss (New York City)	150
Limestone	150
Slate	400
Marble	120
Sandstone	100
Bluestone, North River	300

Safe Extreme Fibre Stress (Bending).

Concrete (Portland) Cement 1—Sand 2—Stone 4	30
" " " 1 " 2 " 5	20
" (Rosendale, or equal) Cement 1—Sand 2—Stone 4	16
" " " " " 1 " 2 " 5	10
Brick (Common)	50
Brickwork (in Cement)	30

The following tables, computed according to the formulas of the New York City Building Law, as published in the Code, will be found convenient for estimating safe floor loads:

Safe loads, in tons of 2.000 pounds. on Cast-iron Rectangular Columns.

Size in Inches.	Thickness of shell in Inches.	Length in Feet.				
		8	9	10	11	12
8 x 10	¾	128	127	125	124	122
	1	165	163	161	159	158
	1¼	200	197	195	192	190
8 x 12	¾	144	142	141	139	138
	1	186	184	182	180	178
	1¼	226	223	220	217	215
10 x 10	¾	146	145	144	142	141
	1	189	188	186	184	182
	1¼	230	228	225	223	221
	1½	267	265	262	259	257
10 x 12	¾	162	161	159	158	157
	1	211	209	207	205	203
	1¼	256	254	252	249	247
	1½	299	296	294	291	288

Safe loads, in tons of 2,000 pounds, on Hollow Cylindrical Cast-iron Columns.

Diameter in Inches.	Thickness of shell in Inches.	Length in Feet.				
		8	9	10	11	12
6	¾	60	59	58	57	
	1	76	75	73	71	
	1¼	90	88	86		
7	¾	75	74	71	70	70
	1	94	92	91	89	88
	1¼	112	110	108	106	104
8	¾	87	86	85	83	82
	1	112	110	108	107	105
	1¼	134	132	130	128	126
9	¾	100	99	98	97	95
	1	129	128	126	125	123
	1¼	156	154	152	150	148
	1½	181	178	176	174	171
10	1	147	145	144	142	141
	1¼	178	176	174	172	170
	1½	207	205	203	200	198
	1¾	234	232	229	227	223
11	1	165	163	162	160	158
	1¼	201	199	197	195	193
	1½	234	232	229	227	224
	1¾	264	262	259	256	253
12	1	183	182	179	178	176
	1¼	223	221	219	217	215
	1½	261	258	266	253	251
	1¾	296	294	291	288	285
	2	330	327	324	321	317

Safe (uniformly distributed) floor loads, in pounds, for each superficial foot. Wooden beams, spaced 16 inches on centres.

Wood.	Size of Beams.	Span in feet. 10	12	14	15	16	17	20	24
HEMLOCK.	3 x 10	158	109	80	70	62	55	39	27
	3 x 12	227	158	116	101	89	78	57	39
	3 x 14	309	214	157	137	121	107	77	54
	4 x 10	210	146	107	93	82	73	53	36
	4 x 12	302	210	154	134	118	105	76	52
	4 x 14	412	286	210	183	161	142	103	71
SPRUCE.	3 x 10	203	141	103	90	79	70	51	35
	3 x 12	292	203	149	130	114	101	73	51
	3 x 14	397	276	203	176	155	137	99	69
	4 x 10	270	188	138	120	105	93	68	47
	4 x 12	389	270	198	173	152	135	97	68
	4 x 14	529	368	270	235	207	183	132	92
WHITE PINE.	3 x 10	203	141	163	90	79	70	51	35
	3 x 12	292	203	149	130	114	101	73	51
	3 x 14	397	276	203	176	155	137	99	69
	4 x 10	270	188	138	120	105	93	68	47
	4 x 12	389	270	198	173	152	135	97	68
	4 x 14	529	368	270	235	207	183	132	92
YELLOW PINE.	3 x 10	316	218	160	140	124	110	78	54
	3 x 12	454	316	232	202	178	156	114	78
	3 x 14	618	428	314	274	242	214	154	108
	4 x 10	420	292	214	186	164	146	106	72
	4 x 12	604	420	308	268	236	210	152	104
	4 x 14	824	572	420	366	322	284	206	142

NOTE.—For Locust post use one and a half the value for White pine—N. Y. Bdg. Law.

Flitch plate girders or spliced or double girders bolted together may be as strong for carrying purposes as single sticks but they will not so well resist fire as the latter.

N. B. The following formula from the New York Building Law was arrived at as the result of Governmental tests and is endorsed by the best engineering authorities. It has also been adopted by the building laws of several other cities. The tests will be found higher than formerly employed for wooden columns, and the rule will enable anyone to compute quickly safe loads for wooden beams.

To calculate safe distributed load on wooden floor beams.

The safe carrying capacity of WOODEN BEAMS for uniformly distributed loads shall be determined by multiplying the area in square inches by its depth in inches and dividing this product by the span of the beam in feet. This result is to be multiplied by—

70 for hemlock,
90 for spruce and white pine.
120 for oak, and by
140 for yellow pine.

EXAMPLES.

What would be the uniformly distributed safe load in pounds, according to the above, for a spruce beam 3″ x 10″—20′ span?

Area. Depth.		Result.		Co-efficient.		Safe distributed load.
$\dfrac{3'' \times 10'' \times 10}{20' \text{ span}}$	and this	15	x	90	=	1,350 lbs.

What would be the uniformly distributed safe load in pounds, according to the above, for a yellow-pine beam 4″ x 12″—22′ span?

Area. Depth.		Result.		Co-efficient.		Safe distributed load.
$\dfrac{4'' \times 12'' \times 12''}{22' \text{ span}}$	and this	26.2	x	140	=	3,668 lbs.

Safe load, tons of 2,000 pounds, on Yellow Pine Columns.

Shape of Column.	Diameter in Inches.	Length in Feet. 8	9	10	11	12	13
Round.	8	19.7	19.0	18.4	17 7	17.0	16.3
	9	25.7	24.9	24.2	23.4	22 7	21.9
	10	32.5	31.6	30.8	29.9	29.1	28.2
	11	40.1	39.1	38.2	37 2	36.3	35.4
	12	48.4	47.4	46.4	45.4	44.3	43 3
	13	57.5	56.4	55.3	54.2	53.1	52.0
	14	67.5	66.3	65.1	63.9	62 7	61.5
Square.	8 x 8	25.1	24.2	23.4	22 5	21.6	20.8
	9 x 9	32.7	31.8	30.8	29 8	28.8	27.9
	10 x 10	41.4	40.3	39.2	38.1	37.0	35.0
	11 x 11	51.0	49.8	48.6	47.4	46.2	45.1
	12 x 12	61.6	60.3	59.0	57.7	56.5	55.2
	13 x 13	73.3	71.9	70 5	69.1	67.7	66.3
	14 x 14	85.9	84.4	82.9	81.4	79.9	78.3

The safe loading of floors is a most important matter, from the fire viewpoint as well as from the structural viewpoint. The tendency of the average occupant of a building is to load the various floors of it according to his needs for storage, without reference to what weights the floors are calculated to carry. In the case of dwellings, for example, farmers often store grain in them, and often on the upper floors, which have the lightest floor beams. We have had numerous fires from the injury to flues caused by the sagging of floor timbers, deflection of beams, etc., disturbing the flues even where the beams have not reached the breaking point.

Seed warehouses have given way under the weight of quantities of seed in bags tiered up to a point beyond the capacity of the beams to carry them. And this class of risks has been very unprofitable.

Agents should pay especial reference to such matters. The average man does not give any thought to the matter.

The writer once found whiskey stored in a dwelling, altered over for a store, and tiered up to a point which required immediate shoring from below, but which would not have been done except for the suggestion as to the strength of the floor.

It is the tendency in cities to meet the demand for new stores or warehouses by altering buildings in the dwelling section without strengthening the floor beams or increasing the thickness of enclosing walls, and such risks may safely be regarded as liable to be overloaded and, therefore, dangerous.

The majority of buildings outside of territories covered by building laws are constructed of 2 x 10 floor beams, which are practically only 2-inch plank on edge. No floor, even for a dwelling, should have beams smaller than 3 x 10, spaced 16 inches on centres and cross-bridged every five feet.

In calculating factors of safety a margin should be allowed for the weight of water thrown by the fire department to extinguish fire—an important matter in the case of merchandise of an absorbent character like fibre. (See page 90.)

Fire Temperatures.

Red	977	degrees.
Cherry	1470	"
Orange	2000	"
White	2370	"
Dazzling	2730	"
Cast-iron fuses at	2000	"
Glass "	2377	"
Steel "	2550	"
Wrought iron "	2900	"
Fire-brick "	4000	"
Wood chars at	350	"
Wood burns at	550	"
Steam is resolved into its natural gases, Oxygen and Hydrogen at	1470	"

DANGER OF RUST IN IRON MEMBERS.

At a convention held some years ago in New York, at which were present a greater number of experts in iron than probably ever met before or since in one room, there was not one who contended that cast-iron would rust beyond the harmless incrustation of the thickness of a knife blade, whereas there was not one who did not believe wrought iron would rust to the point of danger; and there was not one who claimed to know whether steel would or not, each admitting that steel had not been sufficiently tested as to rust to warrant a reliable opinion. If it could be relied upon as rust proof, it would be superior to all other material for fireproof buildings because of its great strength in proportion to weight. The use of steel in construction is growing, because it is cheaper than wrought iron, as lighter weights are used for the same strength, but while in some respects superior to wrought iron, some of the prevailing impressions with regard to it are erroneous. Defects not possible of detection by tests are liable to exist in its structure. Among the first steel beams brought to the city of New York there were instances in which they were actually broken in two by falling from the level of trucks to the pavement, probably due to their having been rolled when too cold, as steel when rolled below a certain temperature becomes brittle. Better beams are now made.

I have already stated that experience with steel to be imbedded in the enclosing walls and fireproofing of buildings has been so brief that no one can tell whether or not it would resist rust. Recent experiments would indicate that it is almost certain to rust to the point of destruction where the fireproof covering of concrete or plaster should crack and admit air. It is claimed that "neat" Portland Cement is a preventive of rust, and by some that concrete would also be a safe covering mixed in the proportions given, Portland Cement, sharp clean sand and hard broken stone, (p. 81 -one, two and five,) the steel being pickled with acid, then dipped in hot milk of lime, and when cold the lime removed with a wire brush—all of which careful preparation, it is needless to say, could not be counted upon in actual every-day practice. Where a vacant space with air should occur in the concrete, a defective cinder or a crack, especially if the coincidence should be near a leaking water, steam or sewer pipe, the most serious results might follow.

While doubt exists as to the exemption of steel from rust, however, there is no doubt whatever entertained by experts as to the rusting of wrought iron to the point of destruction. Cast-iron alone, as already stated, seems immune from the danger of rust.

Numerous newspaper paragraphs appear, at intervals, which claim that metal stripped of its covering of cement has been found exempt from rust, with the paint intact, &c., and the fact is cited as evidence that cement is a preservative of iron and that the danger of rust is over-estimated. Painting, by the way, as already stated, should be done with the best quality of linseed oil and without the use of turpentine, benzine or dryers. It should be thoroughly applied in three coats, with about a gallon to 400 square feet, but the iron should first be thoroughly cleaned of rust and dirt, by pickling or other process. Paint is rarely properly applied, however, and even when of the best quality, is a preservative of the metal, as already stated, only so long as the oil in it lasts.*

Those who claim to have evidence of the exemption of iron from rust rely, I think it will be found, upon iron which has

*It should not be applied in damp weather but only when the metal surface is perfectly dry.

been under exceptionally favorable conditions, free from dampness, the action of gases, etc., overlooking the fact that a leaking water pipe or steam pipe, or the escape of gases from boiler furnaces, will attack iron and gradually but surely consume it. A notable instance of this is the case of the plate girder of the Washington Bridge over the Boston & Albany Railroad, in Boston, where a quarter inch plate girder was recently found to be entirely consumed in places from the operation of gases from the locomotives passing below.

It is quite common to have advocates of wrought iron cite railroad bridges and the elevated railroad structures of New York as proof of their claims, but if they will take the trouble to examine these structures they will discover that, in spite of the fact that they are exposed to view, so that they can be painted frequently, the evidences of rust are unmistakable, especially about the rivets; and one can well imagine what would be the result in the case of riveted iron members in the skeleton structure of a building where such ironwork is entirely concealed from view, periodical inspections being impossible.

Rust is especially liable in the cellars and basements of buildings. The wrought iron friction brakes of freight elevators in the cellars of stores, for example, are frequently found so consumed with rust as to be easily rubbed to pieces in the hand.

Steel rivets are dangerous and they should never be used, unless of a very superior quality, so soft that hammering will not crystallize the material and yet with sufficient tensile strength to insure perfect holding qualities. This is difficult to secure. Their use in columns for buildings is objectionable, as they rust badly under certain conditions. The beam bearing bracket shelf on cast-iron columns should be cast in one piece with the column, and the beams should be bolted to the columns to secure rigidity.

EXPANSION OF IRON.

It is generally supposed and frequently stated that there is a great difference between the expansion of iron and masonry by heat. This is not the case. For example, the length of a bar which at 32 degrees is represented by 1, at 212 degrees would be represented as follows:

Cast Iron	1.0011
Wrought Iron	1.0012
Cement	1.0014
Granite	1.0007
Marble	1.0011
Sandstone	1.0017
Brick	1.0005½
Fire-brick	1.0005

In the fireproof building of the Western Union Telegraph Company in New York, some years ago, a heavy brick pier, seven or eight feet in diameter, adjoined the wall of the boiler furnaces. The difference in expansion in the brickwork next to this furnace wall as compared with that of the remaining brickwork of the pier was so great as to produce a crushing of the material from top to bottom of the pier, for a depth of several inches, and it was found necessary to change the furnace wall and leave an air space between it and the pier.

PROVISION FOR EXPANSION.

Where iron beams and girders are inserted in walls without sufficient space left for their expansion under heat they are almost certain to overthrow the bearing walls by their expansion thrust. A large warehouse in Vienna in which such provision had been contemplated by the architect was totally destroyed, with its contents, by reason of the fact that an officious subordinate, discovering the space in the wall purposely left at the end of each beam, deliberately poured liquid cement therein, which, having set, effectually thwarted the well meant intention of the architect, and resulted in the destruction of the building.

It is a well-known fact that iron responds so readily to temperature that in surveying land, the expansion of a surveyor's one hundred foot iron chain will, in measuring the distance of a mile, result in a variation of five feet between winter temperature and summer temperature, causing an error of one acre in every 533. Of course atmospheric rises of temperature would not affect the protected structural iron in a building.

The expansion thrust of iron beams may be computed upon the following factor of expansion: rolled iron of a length of 1562 feet will expand one-eighth of an inch for every degree of tem-

perature. The heat of a burning building, as already stated, is enormous—sufficient to fuse most known materials; it may safely be estimated to be at least 1000 degrees; therefore, a length of rolled iron of 1562 feet at 1000 degrees of temperature would expand about 125 inches, and a 50-foot length of iron girder would expand between four and five inches, showing that there should be a play at each end of at least two inches if the iron is not fireproofed. Inasmuch as in iron construction the iron beams and girders are usually anchored to the walls to steady them, the space should be left and the tie to the anchor should be by a movable hinge joint, which would be of equal strength with an inflexible anchor for all tying purposes but would yield under the thrust pressure like an elbow and allow play of the beam, or stiff anchors should have elongated holes to allow expansion when beams are of great length. Girders are seldom over 25 feet long, but if bolted together, as is frequently the case, they may be 120 feet or more long, and a line of columns from cellar to roof of a building may easily have one continuous iron structure of two hundred or more feet. It should be remembered, however, that this danger from the expansion of iron may be almost wholly counteracted by protecting it from exposure to fire through the use of non-conducting material. It is more important to protect girders than beams, and columns than either.

The mistaken pride with which the owners of some buildings point to exposed iron beams in ceilings as evidence that the floors are "fireproof," actually justifying the supposition that they are left exposed for such display, would be ludicrous if it were not serious. In buildings occupied for offices or dwellings, where there is not sufficient combustible material to endanger the beams, it is not so objectionable; but in warehouses and stores, filled with merchandise, such construction is dangerous; and if one of the upper floors should give way it would come hammering down to carry with it all below and thoroughly wreck the structure.

In this connection it is well again to say that combustible merchandise should never be stored one hundred feet above the street grade even in a fireproof building, since the average fire department cannot reach it at that height.

The destruction by fire of two fireproof cotton mills in England, one at Stockport on November 5th, 1902, and one near

Manchester on November 18th, illustrates the importance of fireproofing iron columns and the soffits or undersides of iron girders and beams.

A remarkable feature of the Stockport fire was the death and wounding of a number of operatives, who failed to escape, notwithstanding that there was a staircase at each end of the structure. It has generally been supposed that fireproof floors with a staircase at each end of a building insured safety for inmates, but in this case the supposition proves incorrect. It may be that the treads of these staircases were of stone and yielded, as I have elsewhere stated they would yield, to the combined action of fire and water, but at this writing I have not the particulars. I cannot believe the staircases were properly constructed and enclosed.

The great fire in Montreal destroying the Board of Trade building and large warehouses showed the superiority of terra-cotta protection for iron columns over wire lathing and plaster as fireproofing material, and also demonstrated the superiority of cast-iron as compared with steel construction, although the fire showed that both should be protected by a covering of fireproof material. Cinder concrete used in the floor arches was also found destroyed, (see page 502.)

CONDUCTIVITY.

While the difference in expansion between masonry and iron incorporated with it is less per running foot than is generally supposed and while the difference in expansion between a cubic foot of iron and that of a cubic foot of masonry would hardly be noticeable, especially if the iron were covered on all four sides, yet in stretches of 50 feet or more, as in the case of iron I-beams and girders, the cumulative effect of expansion in uncovered iron might be a serious matter—quite sufficient, with the rises of temperature due to a burning building, to push out the bearing walls and wreck the building. Especially is this true of temperatures higher than 500 degrees. It is unnecessary to suggest that metal differs from masonry in the important respect that heat does not travel throughout the entire length of the latter, while it does in the case of metal.

In other words, while the difference between the expansion of a lineal foot of iron as compared with a lineal foot of masonry,

marble, brick, etc., is very slight, the difference in conductivity is very great. The conducting power of silver, for example, being represented by 1, copper would be .845, cast-iron .259, gold .981, marble .024 and brick .01—an important fact to be considered in the construction of buildings. Brickwork raised to a white heat would not raise the temperature of other masonry in the same wall a few feet away, but one end of an iron I-beam could not be raised to a white heat without raising the temperature of the beam for its entire length.

CAST-IRON VERTICAL SUPPORTS.

The vertical supports, columns, pillars, etc., as already stated, should be of cast-iron, cylindrical in form, of liberal thickness, especially in the lower stories, thoroughly tested as to sand holes, thin places from "floating cores," etc. Cast-iron columns should be round, and not square. In the former shape there is less likelihood of defects in casting, sand holes, etc., which prevent uniform sound thickness of shell. The columns should be planed to smooth bearings, so that the entire system from the foundation to the roof, may be securely bolted together and form a continuous line with joints for expansion and without any inequalities of bearings. Under no circumstances should wedges or "shims"* be allowed. This most important matter is often neglected. The flanges and corbel brackets for supporting beams should be cast in one piece with the column and not depend upon rivets or bolts. Rivets, aside from the danger of shearing strains, are almost certain to rust to the point of danger. The beams should be bolted to lugs on the columns, however, as a tie between the side walls, holding the entire structure firmly and consistently together as one rigid whole and yet with play for expansion.

All iron work, columns and pillars, beams and girders, should be fireproofed, i. e., covered with at least four inches of incombustible material, terra cotta or brick. At the floor, and for a height of four feet in mercantile buildings, a metal guard should be provided to prevent the column from being stripped by collisions with rolling trucks for moving merchandise. It ought to be unnecessary to suggest that wooden lagging should, under

*"Shims" are pieces of slate or iron inserted to secure a true vertical where the two surfaces have not been properly leveled or planed.

no circumstances, be used to protect the iron, were it not for the fact that in one of the largest and most costly dry-goods stores in New York, the fireproof covering of the iron columns, which had been seriously damaged by trucks, was being systematically removed in order to substitute wooden lagging, when the fault was, fortunately, detected by an inspector of underwriters. Thick hardwood cleats showing the plaster behind might answer as fenders or guards. Four inches of good brickwork is a good covering, but porous terra cotta or even wire lath and plaster may prove effective. Where wire lath and plaster is used the column should first be wrapped with a quarter-inch thickness of asbestos bound with wire. This would prove reliable and inexpensive.

It is a fact, showing how common is the neglect to cover iron with non-conducting material, that in the New York State Capitol, in the library, is a large plate girder entirely exposed. This girder supports the ceiling beams, and there is enough combustible material in the oak bookcases, furniture and flooring to wreck this portion of the building in case of their combustion by expansion of the beams. The ceiling of the Senate chamber is of heavy hard wood attached to the soffits of the iron beams, which would, if ignited, probably warp and expand the beams to a dangerous point. The New York Building Law was enacted in this building.

A notable instance showing the necessity of protecting ironwork with incombustible material, and the danger of expansion in long lines of iron girders or beams, was that of the destruction of a fireproof spinning mill at Burnley, England, recently. This mill was 210 feet long by 120 feet wide. Six cast-iron girders of the Hodgkinson type, each 20 feet long, spanned the 120 feet width, being bolted to cast-iron columns and carrying, in turn, cross girders of wrought iron. The expansion of these 120-foot girders (they were unprotected) resulted in the disruption of the floor and the destruction of the mill. The cast-iron columns, being unprotected, collapsed under fire and water. The floors were 10′ 6″ bays. As already stated, beams should not be spaced over five feet on centres. Wider spacing results in weak arches, liable to be buckled out by heat or punched through by the falling of safes or of other heavy articles from upper floors.

The probability is that if the 20-foot girders in this building had been arranged with provision for expansion, and all the ironwork had been thoroughly protected with fireproof material, little damage would have been done. The effect would have been more rapid if the floors had been loaded with combustible merchandise. There was little wood to burn in the contents of the spinning mill, and yet the destruction was thorough. Such buildings with uncovered iron work are more dangerous than those of heavy wood construction, in which the timbers are twelve inches in diameter. A properly constructed building with protected iron, however, is, of course, superior to any other form of building. Experienced firemen are afraid to enter buildings supported by iron columns unless they are thoroughly fireproofed, as they are liable to snap without warning under the influence of fire and water, whereas wooden posts burn slowly and give notice of collapse. They will stand a severe fire without being charred for more than two inches of their surface.

COMPARATIVE TESTS OF FIREPROOF MATERIAL.

Tests of fireproof material, iron beams, pillars, floor arches, etc., to be of any value must be conducted under circumstances which insure uniform conditions; otherwise comparisons are unreliable. It is quite customary to refer to results of fires in different buildings, having differing forms of construction, as supporting theories of relative merit; but ordinary conflagrations cannot be relied upon, for the reason that in two buildings, side by side, the conditions may be widely different. Eddies and currents of air, changes of prevailing wind, etc., may secure exemption from damage. It happened in the large conflagrations of Chicago, Troy, Boston, etc., that the most phenomenal escapes were observed. In some instances frame buildings, surrounded by brick structures which were totally destroyed, escaped with no further damage than the blistering of paint.

Even where tests are carefully arranged, especially weight tests, obvious precautions are sometimes overlooked. It will be observed, for instance, where bricks are piled on a surface of floor arch and iron beams to secure a certain weight per square foot, the pile of bricks may be so disposed as to have a bearing on both of the iron beams and the full weight may not come

upon the fireproof arch between them. The lateral bond of a pile of bricks a few courses higher than the floor to be tested, may have all the effect of a relieving arch and materially reduce the strains. In furnaces constructed to secure high temperatures, also, drafts and currents of air should be provided for with great care and under the direction of the most competent and intelligent experts.

Under no circumstances should the iron frame work of a skeleton building be incorporated in thin enclosing walls. No wall that has not a cross section sufficient to support itself without the ironwork, should be allowed, aside from the importance of having it thick enough to prevent the passage of heat from an adjoining building. Curtain walls for enclosing walls, supported by the longitudinal members of skeleton construction are objectionable; they are liable to be buckled out by the expansion of the framework. The great trouble with modern fireproof structures, even under the New York Building Law, is that while the separating fireproof floors tend to prevent the passage of flame from one story to another, the enclosing walls are often insufficient to prevent heat from igniting the contents of an adjoining building, so that what is gained by preventing the spread of fire vertically is lost laterally.

THE INTEREST OF UNDERWRITERS IN FIREPROOF CONSTRUCTION.

In conclusion it may be well to state, in view of the general misapprehension which prevails with regard to the interest of the fire underwriter in the improvement of construction, that it makes no difference to him whether a building be fireproof or not; his rate of premium and the amount which he insures are both based upon the characteristics of each building insured. He would make just as much money on $100 of premium secured at a proper rate of 5% (or $50 per $1,000) for $2,000 insurance on a wooden saw-mill, as on $100 of premium secured for $100,000 insurance on a fireproof building the rate of which is 10 cents per $100 or $1 per $1,000.

The suggestions of underwriters as to safe construction, so frequently made, are evidence rather of their sense of their duty to the community, as good citizens, than of a desire to secure profit through immunity from fire. Indeed, they often make

more money on high rated risks of poorly constructed, wooden buildings than on the lower rates of those of the best construction.

TABLES OF WEIGHTS AND MEASURES.

The following tables of weights and measures, including the decimal Metric System of France, may be found useful:

AVOIRDUPOIS WEIGHT.

drachms.	ozs.	lbs.	qrs.	cwts.	ton.	French grammes
1=	.0625 =	.0039 =	.000139 =	.000035 =	.00000174	=1.77184
16=	1 =	.0625 =	.00223 =	.000558 =	.000028	=28.3495
256=	16 =	1 =	.0357 =	.00893 =	.000447	=453.59
7168=	448 =	28 =	1 =	.25 =	.0125	=12,700
28672=	1792 =	112 =	4 =	1 =	.05	=50,802
573440=	35840 =	2240 =	80 =	20 =	1	=1,016,040

TROY WEIGHT.

grains.	dwts.	ozs.	lb.	French grammes.
1=	.04167=	.00208 =	.0001736 =	.0648
24=	1 =	.05 =	.004167 =	1.555
480=	20 =	1 =	.0833 =	31.1035
5760=	240 =	12 =	1 =	373.242

175 lbs. troy=144 lbs. avoirdupois.
lbs. avoirdupois × .82286=lbs. troy.
lbs. troy .. × 1.2153 =lbs. avoirdupois.

LONG MEASURE.

inches.	feet.	yards.	fath.	poles.	furl.	mile.	French metres.
1=	.083 =	.02778 =	.0139=	.005 =	.000126 =	.0000158 =	.0254
12=	1 =	.333 =	.1667=	.0606=	.00151 =	.0001894 =	.3048
36=	3 =	1 =	.5 =	.182 =	.00454 =	.000568 =	.9144
72=	6 =	2 =	1 =	.364 =	.0091 =	.001136 =	1.8287
198=	$16\frac{1}{2}$ =	$5\frac{1}{2}$ =	$2\frac{3}{4}$ =	1 =	.025 =	.003125 =	5.0291
7920=	660 =	220 =	110 =	40 =	1 =	.125 =	201.16
63360=	5280 =	1760 =	880 =	320 =	8 =	1 =	1609.315

A "cable" = 120 fathoms=720 feet.

SURVEYING MEASURE (Lineal).

inches.	links.	feet.	yards.	chains.	mile.	French metres.
1=	.126 =	.0833 =	.0278=	.00126=	.0000158=	.0254
7.92=	1 =	.66 =	.22 =	.01 =	.000125 =	.2012
12=	1.515 =	1 =	.333 =	.01515=	.000189 =	.3048
36=	4.545 =	3 =	1 =	.04545=	.000568 =	.9144
792=	100 =	66 =	22 =	1 =	.0125 =	20.116
63360=	8000 =	5280 =	1760 =	80 =	1 =	1609.315

1 knot or geographical mile=6082.66 feet=1854 metres= 1.152 statute mile

1 Admiralty knot=1.1515 mile=6080 feet.

SQUARE MEASURE.

inches.	feet.	yards.	perches.	roods.	acre.	square metres.
1 =	.00694 =	.000772 =	.0000255 =	.00000064 =	.000000159 =	.000645
144 =	1 =	.111 =	.00367 =	.0000918 =	.000023 =	.0929
1296 =	9 =	1 =	.0331 =	.000826 =	.0002062 =	.8361
39204 =	272¼ =	30¼ =	1 =	.025 =	.00625 =	25.292
1568160 =	10890 =	1210 =	40 =	1 =	.25 =	1011.7
6272640 =	43560 =	4840 =	160 =	4 =	1 =	4046.7

1 chain wide . . . = 8 acres per mile.
10 square chains = 1 acre.
1 hectare . . . = 2.471143 acres.
1 square mile $\begin{cases} =27878400 \text{ sq. feet.} \\ =3097600 \text{ sq. yards.} \\ =640 \text{ acres.} \end{cases}$
Acres × .0015625 = sq. miles.
Sq. yds. × .000000323 = sq. miles.

CUBIC MEASURE.

ins.	feet.	yard.	cubic metre, or stere.
1 =	.0005788 =	.00000214 =	000016386
1728 =	1 =	.03704 =	028315
46656 =	27 =	1 =	.764513

ALE AND BEER MEASURE.

pints.								
2 =	1 quart.							
8 =	4 =	1 gallon.						
72 =	36 =	9 =	1 firkin.					
144 =	72 =	18 =	2 =	1 kilderkin.				
288 =	144 =	36 =	4 =	2 =	1 barrel.			
432 =	216 =	54 =	6 =	3 =	1½ =	1 hogshead.		
576 =	288 =	72 =	8 =	4 =	2 =	1⅓ =	1 puncheon.	
864 =	432 =	108 =	12 =	6 =	3 =	2 =	1½ =	1 butt.

MEASURES OF CAPACITY.

pints.	gall.	peck.	bushel	quarter	wey.	last.	cub. ft.	litres.
1 =	.125 =	.0625 =	.01562 =	.00195 =	.00039 =	.000195 =	.02 =	.5676
8 =	1 =	.5 =	.125 =	.0156 =	.00312 =	.00156 =	.1604 =	4.541
16 =	2 =	1 =	.25 =	.03125 =	.00625 =	.00312 =	.3208 =	9.082
64 =	8 =	4 =	1 =	.125 =	.025 =	.0125 =	1.283 =	36.32816
512 =	64 =	32 =	8 =	1 =	.2 =	.1 =	10.264 =	290.625
2560 =	320 =	160 =	40 =	5 =	1 =	.5 =	51.319 =	1453.126
5120 =	640 =	320 =	80 =	10 =	2 =	1 =	102.64 =	2906.25

1 gallon in wine, ale, or dry measure
=277¼ cubic inches = .16 cubic foot
=10 lbs. of distilled water
Cubic feet × 6.2355 = gallons.
Cubic ins. × .003607 = gallons.
1 bushel = 2218.19 cubic inches = 1.28 cubic foot.
Cubic feet × .78 = bushels.
Cubic ins. × .00045 = bushels.

WINE MEASURE.

pints							
2 =	1 quart.						
8 =	4 =	1 gallon.					
336 =	168 =	42 =	1 tierce.				
504 =	252 =	63 =	$1\frac{1}{2}$ =	1 hogshead.			
672 =	336 =	84 =	2 =	$1\frac{1}{3}$ =	1 puncheon.		
1008 =	504 =	126 =	3 =	2 =	$1\frac{1}{2}$ =	1 pipe.	
2016 =	1008 =	252 =	6 =	4 =	3 =	2 =	1 tun.

FRENCH METRIC SYSTEM.

LONG MEASURE.

	Metres.	Inches.	Feet.	Yards.	Miles.
Millimetre....	.001	.03937	.00328	.00109	—
Centimetre...........	.01	.3937	.0328	.0109	—
Decimetre............	.1	3.937	.328	.1093	.00006
METRE*.	.1	39.37079	3.2809	1.09363	.00062
Decametre...........	10	—	32.809	10.936	.0062
Hectometre...........	100	—	328	109.36	.06214
Kilometre............	1,000	—	3280.9	1093.6	.62138
Myriametre..........	10,000	—	—	—	6.21382

*1 metre = 1.093633056 yard.

SQUARE MEASURE.

	Square Metres.	Square Inches.	Square feet.	Square yards.	Acres.
Milliare....	.1	155	1.076	.119	—
Centiare†............	1	1550	10.764	1.19	.00025
Deciare..............	10	15501	107.64	11.96	.0025
ARE.................	100	—	1076.4	119.6	.0247
Decare...............	1,000	—	—	1,196	.2471
Hectare.....	10,000	—	—	11,960	2.4711

† Or 1 square metre = 1.196033292 square yard.

SOLID MEASURE.

	Cubic metre.	Cubic inches.	Cubic feet.	Cubic yards.
Millistere............	.001	61.028	—	—
Centistere	.01	610.28	.353	—
Decistere.............	.1	6,102.8	3.5317	.1308
STERE, or cubic metre.	1	61,028	35.317	1.308
Decastere	10	—	—	13.08
Hectostere...........	100	—	—	130.802

WEIGHTS.

	Grammes	Avoir-dupois ounces.	Avoir-dupois lbs.	Cwts.	Tons.	Grains Troy.
Milligramme........	.001	—	—	—	—	.015
Centigramme.........	.01	—	—	—	—	.154
Decigramme.........	.1	—	—	—	—	1.543
GRAMME.............	1	.035	.0022	—	—	15.432349
Decagramme.........	10	.35	.022	—	—	—
Hectogramme........	100	3.527	.22046	—	—	—
Kilogramme..........	1,000	35.2739	2.2046	.019	.00098	—
Myriagramme........	10,000	—	22.04	.1968	.00984	—
Quintal.............	100,000	—	220.46	1.9684	.0984	—
Millier or Bar........	1,000000	—	2204.62	19.684	.984206	—

DRY AND FLUID MEASURE.

	Litres.	Inches.	Feet.	Gallons.	Bushels.
Millilitre	.001	.061	—	.00022	—
Centilitre....	.01	.61	—	.0022	—
Decilitre.............	.1	6.1	—	.022	.0027
LITRE*..............	1	61.02	.0353	22	.0275
Decalitre............	10	610.28	.353	2.2	.276
Hectolitre............	100	—	3.53	22	2.751
Kilolitre†............	1,000	—	35.317	220	27.512
Myrialitre............	10,000	—	353.17	2200.967	27.5121

*Litre = .22009668 gallon = a cubic decimetre.

†Kilolitre = a cubic metre.

STANDARD

UNIVERSAL SCHEDULE

FOR RATING

MERCANTILE RISKS

EDITION JANUARY, 1902.

FOR INDEX SEE BACK OF BOOK.

N. B.—This schedule must be taken as a whole to get proper results; charges and deductions are numerous and not over-large in any case, the idea being to make equitable rates, so that every property owner will pay for the defects of his risk, and get the full benefit of all its good points.

UNIVERSAL SCHEDULE COMMITTEE.

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JAS. A. SILVEY, GERMAN AMERICAN INS. CO.,
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J. M. CAROTHERS, PHŒNIX INS. CO., Hartford,
EDWARD CLUFF, LONDON ASSURANCE CORPORATION,
H. B. SMITH, HOME INS. CO., New York,
C. L. HEDGE, FIREMAN'S FUND, California,
E. M. McCHESNEY, WESTCHESTER F. INS. CO., N.Y.

Underwriters' Association of Middle Department.

E. O. WEEKS, AETNA INS. CO., Hartford,
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E. LITCHFIELD, LANCASHIRE INS. CO.,
W. S. BANTA, GENERAL AGENT, New York,
W. H. CROLIUS, AMERICAN INS. CO., New York.

EXPLANATORY.

The plan or scheme on which the Committee have framed the following schedule has been to secure a rate on which the fire cost of the past five years per $100 of insurance, would result in such percentage of the premium as with an allowance for proper expenses and, also, for accumulation for periodical and inevitable sweeping fires or conflagrations, would leave margin for a moderate profit not exceeding five per cent. The insuring public cannot object to rates based upon so moderate a profit.

In localities where the fire loss exceeds $5 per $1,000, resulting from abnormal local causes or moral hazard, the cost of which can only be assumed from results and measured accordingly, they have provided (at No. 30) for an addition to the rates, for each one dollar of loss in excess of five, of 20% of the key-rate, which will amount to ten cents on each $100 of insurance, and approximately maintain the equilibrium between fire-cost and rate of premium.

The Committee have not only carefully considered the actual experience of the last five-year period in fire-cost per one hundred dollars of insurance, but they have also secured, by conference, concurrent expert opinion as to charges.

In fixing the charges for variations from standard construction, they have graded them according to their relative importance with reference to the integrity of the entire building, those for defects in the more important portions of the building from fire-resisting standpoints—staircases, elevator shafts, floors, &c., for example—being larger percentages of the rate of a standard structure.

The rates have been graded to admit of liberal concessions for effective fire appliances; in the case of casks and pails, for example, a percentage has been allowed which will secure their general introduction. Experience justifies this. In mills, a class of risks where they are generally provided, over sixty per cent. of the total number of fires have been extinguished by their use, due of course, to the fact that the most ignorant employee knows how to apply them. No fire ever started which could not, at one stage, have been extinguished by a cupful of water.

While the requirements for standard construction in the schedule may be regarded as exceptionally high, and while there are few buildings which comply with them, it will be conceded that there ought to be more, and the compilers believe that the best way to secure their erection is to recognize, in advance, the merits of ideal construction. They realize, however, that if, in order to secure this, they should frame an elaborate schedule to be applied by charges for deficiencies, to all risks (the great majority of which are unprovided with such exceptional and unusual features of construction as wire lathing, heavy floor beams, fire stops in partitions, etc., etc., and are outside the protection of such fire-extinguishing appliances as water-towers, extra large fire departments, automatic fire-alarms, etc., etc.) they would cause unnecessary labor in nine risks out of ten. They have, therefore, arranged the schedule by providing for exceptional features by means of deductions, and the main body of the schedule is so framed as to be applicable to the majority of risks and towns. In fact they have not, in all cases, charged for deficiencies from specifications of a standard building, especially in such requirements as chamfering the ends of floor beams, fire stops in partitions, etc., which an inspector would find it difficult to investigate. There is good reason, nevertheless, for including these specifications in the standard, which is intended to be educational, in order that it may be placed in the hands of a property-owner contemplating the erection of a building, as an explanation of proper construction.

On the other hand, there will be found, in some instances, an apparent duplication of charges or deductions, which is not, however, without reason. For example, city fire departments and water-works are first considered in the City Schedule, because all risks partake in the general benefit of their power to prevent sweeping conflagrations; while, afterwards, in the Building Schedule, a deduction is made for proximity of each risk to one or more hydrants, with a further deduction if the street water-pipe be fed by mains at each end, which would double its capacity to supply engines. This arrangement with the provision as to accessibility of street to fire engines, etc., insures indirectly that only those risks shall get the full benefit of the fire department in rate which come thoroughly under its protection.

The compilers of the schedule believe that only two or

three applications of it will be necessary to disabuse the mind of any first impressions as to its being either intricate or unnecessarily elaborate, and they hope that a careful examination of its provisions will convince any underwriter that, although he will have to know a great deal about a risk before he can apply it, yet, unless he possesses such knowledge of the risk on every point for which there is a charge or a deduction, he will not know enough about the risk to insure it. If, therefore, for the purpose of insuring it he must be possessed of the information needed to apply the charges, the application of the schedule cannot be other than a help to him, if only as a check upon memory and judgment as to the relative and consistent value of all features of construction or extinction, some of which would certainly be overlooked by any other process; in fact, no mere mental process would correctly sum up all the good and bad features of a risk so as to accurately measure them in the rate, no matter how thorough and competent might be the examining expert.

The committee have taken pains to secure the advice and suggestions of hundreds of expert underwriters throughout the country, and they believe the schedule to be correct. If, however, in any locality, it is thought to produce results which are too low, in the opinion of local underwriters, they suggest that it will be better to make any additions which may be deemed necessary by percentage additions after the rate of each risk has been obtained by the schedule, rather than by making any changes in the specific items of the schedule itself. Whatever in the judgment of its critics, may be its faults, its compilers claim that it is at least consistent, and that the charges and deductions are relatively correct—a most important matter. If mere off-hand opinion, no matter how expert, is to be regarded as the test of its accuracy, then even those who rely upon such a test will surely not reject, as a basis for opinion, a result arrived at by a process designed to be thorough, systematic and analytically harmonious. The Committee, therefore, urge that all risks be rated by it, and that afterward any percentage additions be made to the result which may be thought necessary to adjust the rates to local conditions, after which they can be printed in tariff form for the use and convenience of local agents.

The committee further suggest that, in case reductions

are found to be necessary to meet the competition of companies disposed to cut rates, it will be better to adhere to the printed tariff obtained in this manner, and meet the cuts by percentage deductions therefrom rather than to throw prices open ; in this respect following the example of merchants, who adhere to a "price-list" but sometimes vary the discounts, finding it much easier afterwards to reduce the discount, and so indirectly raise the rate, than to alter the printed figures of the price-list. As a rule, policy-holders refer to their policies to ascertain previous rates when renewing them, and can be more easily convinced that the discount of a previous year has been found to be too large than that a rate written in the policy has been too low.

The history of the insurance business proves that where rates are once thrown open, it is difficult afterwards to raise them and that they generally, if not invariably, readjust themselves upon some lower level than that from which they fell.

ORDER OF TREATMENT.

It is believed that no experienced underwriter would question the propriety of the order of treatment in which the various considerations are arranged for computing the rate.

First. The KEY-RATE OF THE CITY is computed.

Second. To this are added the charges for the deviations from standard construction of the particular building to be rated.

Third. FEATURES OF EXCEPTIONAL CONSTRUCTION of rare occurrence, as already explained, are treated as deductions, saving the time—a serious matter—which would be required to consider them if treated by charges made for their absence; and saving, also, the loss to the companies in case charges should be overlooked, as they frequently would be.

Fourth. DEDUCTIONS FOR FIRE APPLIANCES. At this point the rate of the building and the rate of its stocks of merchandise proceed on different lines. Fire-extinguishing appliances in some cases are of greater benefit to buildings than to stocks. Certain features of construction, like No. 178, for example (self-releasing floor beams), are of advantage to the building, but of none whatever

to the stock, which would be totally destroyed at the point where the floor beam or girder should break. Some considerations, moreover, like skids for raising merchandise above the floor, apply to stocks but not to buildings.

The DEDUCTIONS FOR SPRINKLERS. This last deduction follows all the rest, for two reasons: First, the owner of property does not decide to put in sprinklers, in any case, until he is in position to tell what his net rate is and what he will save by so expensive a precaution; and, second, the underwriter cannot properly estimate the value to him in rate of automatic sprinklers unless the percentage of allowance is based upon the net rate after all other fire-extinguishing appliances have been estimated and allowed for.

Fifth. EXPOSURE should be treated differently also, for buildings and stocks.

Sixth. CO-INSURANCE. The deduction for co-insurance naturally comes last of all, for the double reason that on the final rate of a building, measuring its probabilities of salvage, depends the value or necessity of co-insurance, both from the underwriter's point of view and the property-owner's point of view. All rates are promulgated at the net figure for 80% co-insurance. If, at any time, mistaken legislation in any state should prevent the introduction of the 80% co-insurance clause and the allowance for it, the situation will be easily met, since the rate will then be put back to that at No. 131, and it will be plain to the legislator, as well as to the owner, that the whole question is purely one of rate and the legislation will only deprive the assured of a reduction in rate to which he would be entitled by the amount of insurance carried by him because he is prohibited from inserting the clause in his policy, as was the case not long since in the state of Maine. There would be a great advantage in not having to raise the rates to meet the new condition, it being only necessary to take the rate already computed by the schedule for insurance without co-insurance.

Seventh. FAULTS OF MANAGEMENT. These, as hereafter explained, follow all other charges, so that they can be deducted bodily in gross without computations in case they are corrected, as they generally would be.

EXPLANATIONS TO PROPERTY OWNERS.

The committee believes that it would be wise to let the property owner see how his rate is computed in every case, in order that any corrections may be made at once, as most of them would be. We believe that it would be as injudicious, not to say unfair, to a property owner to refuse to let him see how his rate is computed as it would be unfair and suspicious for a tradesman to refuse to let his customer see merchandise weighed or measured. If anything would tend to make the property owners of the city satisfied with their rates, or, at any rate, deprive them of grounds of objection, it would be a system of rating which discriminates as to faults and merits and has the advantage of being thorough.

SOME ADVANTAGES OF RATING BY SCHEDULE.

1st. IT SECURES ACCURATE RATING, by carefully taking into account each feature of construction and each feature of fire prevention and extinction.

2d. IT SECURES CONSISTENT AND, THEREFORE, EQUITABLE RATING, by rating risks of the same character in the same town alike, and risks of the same character in different towns on the same basis.

3d. AS A CONSEQUENCE OF THESE TWO, IT PREVENTS OPPOSITION ON THE PART OF POLICY-HOLDERS AND LEGISLATORS, which, as a rule, grows out of apprehensions of injustice and invidious discrimination either as to risks or localities, sometimes too well founded, and which cannot be allayed, except by intelligent explanation. With a printed schedule which puts every man's risk and every city on a like basis, and which can be handed to the property-owner, enabling him to examine for himself why the rate of his risk is higher than that of his neighbor, there can be no ground for prejudice or jealousy.

4th. IT ENCOURAGES PROPER CONSTRUCTION OF BUILDINGS, by intelligently charging for deficiencies from standards and by recognizing exceptionally good construction by deductions. The architect, builder and property-owner, informed at the outset as to what can be saved by proper

construction, will be led to avoid many of the faults now prevailing, which have grown, not unnaturally, out of the present system of conducting the insurance business. Intelligent and explicit answers to inquiries of this nature are due to every inquiring property-owner, and can be best provided for by a proper rating schedule. With such a schedule, dealers in building materials and fire-resisting and extinguishing appliances will become advocates and exponents of it, using it to induce owners to construct new buildings in accordance with correct methods, thus lessening the danger of sweeping conflagrations in cities, since a single building, properly constructed in a large city, may prove the barrier which will enable the fire department to control a fire, as was the case in the great Boston fire of 1889.

5th. IT IS CALCULATED TO PREVENT ANTI-COMPACT LAWS prohibiting agreements as to rates It would require slight argument with an intelligent legislator to convince him that a proper schedule for correctly measuring fire hazard is directly in the interest of all property-owners and in line with public policy, and that it can only be secured by conference of companies for combining their experience and by their co-operation to secure its enforcement. It may be possible to convince him that security to the policy-holder depends not alone upon capital, but upon intelligent management, correct methods and adequate rates. An idiot or a spendthrift can dissipate capital, no matter how large, whereas intelligent management, correct methods and adequate rates are always indispensable with capital as security.

6th. IT WILL DISCOURAGE THE PAYMENT OF EXCESSIVE BROKERAGES AND COMMISSIONS, discriminating as to so-called "preferred" classes of risks. By rating all classes—buildings and stocks—on a basis which will make all alike desirable, there will be no reason for discriminating commissions. If the schedule is correctly made, there will be as much profit for the underwriter in the poorer classes, at the higher rates of premium, as in the better classes, at the lower rates of premium.

7th. IT WILL INSURE MORE THOROUGH INSPECTION, which implies correction of faults and prevention of fires. Enforcing knowledge on the part of the inspector of each departure from correct standards, it will be a check not only upon his thoroughness, but upon his judgment and memory. It will tend to educate inexperienced inspectors

for their work. It will do away with "sidewalk inspections" and necessitate that each building shall be examined from cellar to garret. No underwriter can be sufficiently informed as to the details of a risk, unless he knows enough of it to rate it by this schedule.

8th. IT WILL PREVENT EXCESSIVE DEDUCTIONS FOR FIRE DEPARTMENTS. At present, the purchase of a new steam fire-engine is regarded by property-owners and by some insurance agents as a reason for at once cutting rates in two. With a proper schedule in the hands of local underwriters no such mistake need be made. The schedule will also assist in securing reforms in fire departments by making proper charges for faults, disbanding of force, failure of waterworks, etc., etc., which when now made in specific cases are regarded as threats and antagonize property-owners. With a standard schedule, to which their attention can be called, showing that the demand is no new thing or invidious exaction, but an obvious and necessary adherence to the basis on which the rates of the town have been made, such antagonism and hard feeling will be avoided.

9th. IT WILL TEND TO PREVENT COMPETITION AND THE CUTTING OF RATES. A merchant when informed as to the system by which his rate is ascertained as the result of concurrence of judgment and actual experience, and on a basis of adequacy will not be so ready to accept the policy of a Company which makes its price by "rule of thumb" and can give no intelligent explanation of its ability to carry the risk at the lower rate. If, on the other hand, rates are not made by schedule, the most intelligent underwriter can give no better reason for requiring the higher rate than can his competitor for accepting a lower one; in either case it is a matter of expert opinion, with the property owner's inclinations in favor of the lower-priced man, since property owners, as a rule, regard their own risks as free from fault.

ESSENTIAL FEATURES OF ACCURATE RATING.

A schedule to be correct must recognize each of the following principles:

FIRST.—Standards of construction and standards of environment or condition as to fire departments, waterworks, topography, etc.

SECOND.—Fire Departments and extinguishing appliances

must receive three-fold treatment and be divided so as to apply

a. For the minimum credit, to all risks benefited as regards conflagration hazard or danger from sweeping fires.

b. For the maximum credit, for full protection, only to those risks entitled to it by reason of proximity to hydrant service, fire-engine houses, size of street mains, accessibility of streets, etc.

c. To buildings separately from stocks.

THIRD.—Exposures must receive separate treatment as to buildings and stocks.

FOURTH.—Stock rates must differ from building rates according to construction and fire department.

A Standard City is one having gravity waterworks, with head sufficient at all hours, to throw over five-story buildings. The main supply pipe to be in duplicate unless intermediate storage reservoir be provided. Water pipes and mains to be not less than six inches in diameter in dwelling section, and not less than eight inches (as a minimum) in mercantile section (they ought to be ten and twelve inches); a paid fire department, 12 men to each steamer; not less than two steam fire-engines to each square mile of compact portion, or one to each 10,000 population up to 500,000 population; hook and ladder trucks, one to every four steamers; fire-alarm telegraph; efficient police; paved, macadamized, or other hard streets, the majority of which—say 60 %—are 70 feet or more in width; a good building law, well enforced; no outlying exposures, such as lumber districts, etc., to cause sweeping fires; no unjust municipal and State taxation and a previous five-year, fire record of not exceeding $5 annual fire loss to each $1,000 of insurance.

A Standard Building is one having walls of brick or stone (brick preferred), not less than twelve inches thick at top story (16 inches if stone), extending through and 36 inches above roof in parapet and coped, and increasing four inches in thickness for each story below to the ground—the increased thickness of each story to be utilized for beam ledges. Ground floor area not over 2,500 square feet (say, 25 by 100); height not over four stories, or 50 feet; floors of two inch plank, (three inches better) covered by $\frac{7}{8}$ or

one-inch flooring, crossing diagonally, with waterproof paper or approved fire resisting material between (if tin or sheet-iron between, see deductions); wooden beams, girders, and wooden story posts or pillars twelve inches thick, or protected iron columns; elevators, stairways, etc., cut off by brick walls or by plaster on metallic studs and lathing, communications at each floor protected with approved tin-covered doors and fire-proof sills; windows and doors on exposed sides protected by approved tin-covered doors and shutters; walls of flues not less than eight inches in thickness, to be lined with fire-brick, well-burned clay or cast-iron, and throat capacity not less than 96 square inches if steam-boilers are used; all floor timbers to be trimmed at least four inches from outside of flue; heated by steam; lighted by gas; cornices of incombustible material; roof of metal or tile; if partitions are hollow or walls are furred off there must be fire-stops at each floor.

Basis Rate.—The basis rate of a Standard Building in a Standard City.................... 25 cts.

To ascertain the basis rate of a Standard Building in any city or town differing from the above standard, add to the basis rate of 25 cents for a Standard Building in a Standard City, the following charges for deficiencies of the city from such standard.

Note.—The Standard Building is intended to be educational in order that any one contemplating the erection of a building may be advised how to build as well as how to escape charges in rates of insurance. For this reason, requirements of safe construction are mentioned which are not charged for afterward if omitted, because, after a building is erected, the inspector cannot ascertain whether they have been complied with or not. A sensible owner may, if advised, comply with them even though no penalty be imposed.

ANALYSIS OF CITY SCHEDULE TO ASCERTAIN THE KEY-RATE.

1. NON-FIRE DEPT. TOWNS—If town is deficient in having no water-works (11), fire-engines (12), fire-alarm telegraph (14), police system (15), fire department organization (16), fire marshal or fire coroner (22), nor other appliances than buckets and cisterns, add.......................... 32 cts.

Note.—This clause is intended to group the charges of towns having no fire-department or water-works, to save time in making up the "key-rate," and covers items 2 to 22 both inclusive.

It is not necessary to elaborate upon the explanation of this clause; it greatly facilitates computing the key-rate of towns which are entirely without fire appliances.

2. WATER-WORKS—If gravity system but not standard pressure or direct pressure, being simply sufficient to keep mains full for supply of engines, charge............. 2 cts.

Note.—This deficiency will entail charge for No. 12, if no steamers to supply needed pressure, and will, also, not entitle the city to reduction for auxiliary steamers, No. 33, which will practically increase charge. The advantages of water-works are brought home to each risk by hydrant deductions, Nos. 155, 190, &c.

A gravity system of water-works is of importance for two reasons:

1st. The pressure is always available night and day for supplying the necessary force, which cannot be said of the so-called direct pressure systems, such as the Holly system and others, which may not have steam up for the pumping engines, or which have been known to break down when most needed.

2d. Exerting a uniform pressure on the pipe system, there is less danger of rupture of mains than in the case of direct systems, which exert suddenly an abnormal pressure for an occasion.

The schedule is, therefore, based on a standard of gravity water-works with sufficient head, and any variation from this requirement entails a charge, not measured simply by the two cents in the key-rate above, but, as suggested in the above note, subjecting the city to the charge for absence of steamers, at No. 12, and depriving the city of the reduction for auxiliary steamers, No. 33.

Indirectly the advantages of a gravity system are recognized by hydrant deductions later on, 155, 190, &c., and the deduction for gravity pressure on both buildings

and stocks, pages 47 and 50. These properly recognize the advantages of a gravity system.

3. If not gravity, standard pressure, but instead thereof a direct pressure system, duplicate pumps operated by water power, add.. 3 cts.

For reasons already stated, a direct pressure system is not equal to the gravity, and should be charged for. Water-power pumps are preferable to steam pumps as steam might not be up at time of fire.

The succeeding paragraphs, Nos. 4, 5 and 6 recognize the difference between duplicate pumps and single pumps, and pumps operated by steam power, both single and duplicate machinery.

4. If pumps not in duplicate, charge instead of No. 3 ... 5 cts.
5. If direct pressure system, pumps operated by steam-power, but with the pumping machinery in duplicate, charge 4 cts.
6. If direct pressure system, pumps operated by steam-power, pumps not duplicate, charge...................... 7 cts.

The duplication should extend to all essential features of the plant, boilers, etc.

7. If direct pressure, but without stand-pipe or reservoir with capacity of ten hours' supply, at full pressure—75 lbs. at hydrant, (unless pumping machinery is in duplicate, in which case add 2 cts.), charge in addition to Nos. 3, 4, 5 or 6. 5 cts.

A stand-pipe or elevated reservoir even of ten hours' supply is of advantage, but particularly in cases where the pumping machinery is not in duplicate, as is recognized in this paragraph.

8. If pumping station is endangered by, or occupied in part for, electric-light station, special hazard, or for other purpose, add not less than.............................. 10 cts.

The fault of utilizing the machinery and building of a pumping station for an electric-light station or other hazard, whose destruction would endanger the pumping station, in itself not likely to burn, seems to be overlooked with a frequency that is incomprehensible.

Fire-proof Pumping Station. It would seem unnecessary to state that the building on whose existence the safety of a city depends should be safe from fire and separated from dangerous manufacturing or other hazards and especially from Electric Lighting Stations. It will be observed that charge is made (item No. 8) for an electric-light station or other special hazard in the pump-house or exposing it. It is a grave question if this charge ought not to be higher, even to the extent of making the "key-rate" of a city having a direct pressure system, so jeopardized, higher than that of a town with-

out any water-works at all, in view, first, of the fact that individual risks in such a town get credit afterwards for proximity to hydrants to the extent possibly of 15% (see Nos. 155, 156) and, second, of the fact that a company's conflagration line in the direct pressure town would have been increased by reason of the pressure, but all benefit of the system lost if a fire destroying the pump-house should happen to be coincident with the raging of a conflagration in the city.

9. If not duplicate Supply Main from reservoir or pumping station, add.. 2 cts.

(If intermediate storage reservoir or stand-pipe with 10 hours supply to be relied upon in case of breakage, no charge.)

This charge probably does not need suggestion as to its propriety.

10. If water-pipes in mercantile portion be less than 8 inches, as a minimum, or if hydrants be less than 6-inch barrels, charge according to deficiency, but not less than.. 3 cts.

This matter will be found to be more fully explained in the article on Water Supply.

11. If the only water supply is from public and private wells and cisterns, or natural streams, canals or ponds near enough to compact portion to be available with engine suction, charge, according to supply, not less than............ 10 cts.

This clause is self-explanatory, but it may be well to state here, what will probably be observed, viz., that it does not measure the entire difference between a town without any water supply other than private wells and cisterns and a town with a poor water supply; an unsupplied town would have higher rates by not securing the deductions later on for proximity to hydrants, etc., Nos. 155, 156, etc., page 45.

WATER-WORKS IN THE UNIVERSAL SCHEDULE.

It will be observed that the schedule recognizes efficiency and reliability of water-works in the following order:

1. Gravity system, with an "effective head" and "volume" at the hydrants. For recognition in schedule rating, the reservoir should contain at all times at least five days' supply for domestic and fire service which should be maintained and is more reliable if supplied by hydraulic pumps in duplicate, from a river or other inexhaustible supply,

not liable to drought. If the pumps, whether steam or hydraulic, are arranged to secure also direct pressure on the pipes in emergency, as already explained, both kinds of service may be secured.

2. Hydraulic Pumps, in duplicate, with storage reservoir or tank stand-pipe of ten hours' supply for domestic and fire service.

3. Steam Pumps, in duplicate, with a tank stand-pipe or storage reservoir of ten hours' supply for domestic and fire service.

4. Direct pressure from Hydraulic Pumps, in duplicate, without tank stand-pipe or storage reservoir.

5. Direct pressure from Steam Pumps, in duplicate, without tank stand-pipe or reservoir.

A reservoir system is preferable to all others, and insures uniform pressure in pipes, involving less danger of breakage. While a large reservoir is desirable for storage purposes, however, it is not indispensable for fire purposes. A reservoir sufficient to hold a supply for both domestic and fire service of ten hours would probably be ample for extinguishing any fire. One million gallons storage will supply eleven, standard, 250 gallon fire streams for six hours, and for the ordinary city up to 15,000 inhabitants, a million gallons could be considered an ample storage reserve for fire purposes.

CAPACITY OF CISTERNS OR STAND-PIPES IN U. S. GALLONS.

For each 12 inches of depth.

The following table will enable any one to estimate the capacity of tank stand-pipes or cisterns of cylindrical form in U. S. gallons for each 12 inches of depth :

4 feet diameter,	94	11 feet diameter,	711
5 " "	147	12 " "	846
6 " "	211½	13 " "	993
7 " "	288	14 " "	1,115½
8 " "	376	15 " "	1,322
9 " "	476	20 " "	2,350
10 " "	587½	25 " "	3,672

For example, a cistern 25 feet in diameter would contain 3,672 gallons for every foot of depth ; and if 10 feet deep, 36,720 gallons, or 918 bbls.

A simple rule may be stated as follows: To find the contents in U. S. standard gallons *for each foot of depth* of a cylindrical cistern with a circular base, *multiply the square of the diameter (in feet) by* 5⅞ ; *the product will be the contents in gallons.**

For example, a cistern 20 feet in diameter and 10 feet deep would contain 20×20×5⅞×10=23,500 gallons (see table on page 16).

12. STEAM FIRE-ENGINES—If none, add........... 7 cts.
" " " If one, add............ 4 cts.

No charge for absence of steam fire-engines, if direct pressure system or gravity water-works with head sufficient to throw a 1⅛ inch stream through 200 feet of hose over highest building and sufficient good hose for at least six streams. This would require an effective head at hydrants of 160 feet, or say a pressure of 75 lbs.

This charge is intended to measure the absence of steam fire engines only in the key-rate and its effect upon all risks in the town. The standard requirement is two steamers per square mile and this is a deficiency charge.

13. HOSE—If less than 1,000 feet of serviceable hose per steamer (there should be 2,000 feet) or less than 20 feet per hydrant, if direct pressure (but not less in any case than a total of 2,000 feet), charge according to circumstances, size of town, character of buildings, etc., but not less than.. 3 cts.

(No charge, of course, if charge has been made for absence of steamers, of direct pressure, etc.)

14. FIRE-ALARM TELEGRAPH—If none, add...... 5 cts.

(Underground wires preferable.)

NOTE.—If fire-alarm system is by key boxes (objectionable), the keys to be deposited in some public place accessible to citizens as well as policemen and firemen. Neighboring drug stores, for example, are good depositories, because accessible at most hours of the day and night. The Central Station should not be in a dangerous building.

The keyless boxes are preferable to make sure that an alarm will be sent in promptly and to save the delay of searching for the key. The fears that alarms will be sent in by mischievous persons prove unfounded in actual practice. Underground wires, of course, prevent interruption of service by storms or falling buildings.

15. POLICE ORGANIZATION.—If none, add......... 2 cts.

Self-explanatory.

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* The cubic contents in feet of a cylinder like a cistern are obtained by multiplying the area of the circle by the depth in feet. Inasmuch as the area of a circle is obtained by multiplying the square of the diameter by .7854, and inasmuch as a cubic foot of water contains 7.48 gallons, it is only necessary to multiply the square of the diameter by the product of 7.48 × .7854=5⅞, to obtain the result in gallons, without the longer computation.

16. FIRE DEPARTMENT ORGANIZATION—If none, charge.. 6 cts.

(If charge is made for 16, omit 17, 18, 19, 20 and 21.)

17. If less than 12 paid men to each steamer, or four men to each hose cart where direct pressure or gravity system is relied upon, add.. 2 cts.

18. If only engineer and driver paid, add.............. 3 cts.

If not paid by municipality but by Volunteer Department charge 4 cents and omit No. 21.

(No charge if no steamers.)

19. If firemen paid according to number of fires attended, charge same as No. 16 .... 6 cts.

20. If paid fire department, but not free from improper political control and influences, add from 1 cent to......... 4 cts.

21. If volunteer, add.................................. 5 cts.

These charges will be self-explanatory.

22. FIRE MARSHAL OR FIRE CORONER—If none, add.. 2 cts.

The smallness of the charge would probably be the only criticism made upon it; but it was carefully considered and is believed to be relatively correct.

23. STREETS—In mercantile section, if not paved or macadamized, or if exceeding say 10% are impassable for engines during wet seasons, add.......................... 2 cts.

NOTE.—While streets are impassable the fire engines and extinguishing appliances of a city are, of course, practically useless.

24. If exceeding 40% of whole number in mercantile section are less than 70 feet wide, add.................... 2 cts.

These clauses need no explanation.

25. BUILDING LAW—If none, or not well enforced, or if no ordinance as to storage of explosives, etc., add.... 3 cts.

It has been suggested that charge No. 25 is too low, but the intimation overlooks the fact that this entire schedule is, in effect, a building law and, by its penalties of charges and encouragement of deductions, will do more to enforce proper building methods than any municipal or state regulation which is simply mandatory.

26. ELECTRIC TROLLEY (or other dangerous) system of street railway, add.. 2 cts.

27. CONFLAGRATION HAZARD—Danger of sweeping fires from outlying exposures, such as extensive frame or lumber districts, aggregations of special hazards, especially wood-workers, about a common water-power, or along a water-front near enough to endanger city, not less than.. 5 cts.

This charge should be very carefully considered. The schedule is based upon the ordinary conflagration hazard of the average city. Where mercantile and other build-

ings are abnormally high, especially in the class of towns known as "six-story towns with two-story fire departments," water mains small, and general construction poor, by reason of incorrect building methods, defective bricks and mortar, etc., a liberal charge should be made under this item. The "lay of the land" also should be taken into account, and an extra charge should be made for cities built upon a hill or mountain side, such as Quebec, St. Johns, N. F., Lynchburg, Va., etc. Such conditions minimize the separating effect even of wide streets. Where cities are located in cañons, also, a charge should be made, as in the case of Hot Springs, Ark., Virginia City, etc. (The latter town was destroyed in 1875.) In Astoria, Ore., the business section is built on spiles, with an air space below, and is therefore more liable to a sweeping fire by reason of this fact.

The destruction, in May, 1900, of Ottawa and Hull, Can., due to the burning of large accumulations of lumber, outlying exposures, etc., is a more recent instance enforcing the importance of studying the environment of cities.

28. NATURAL GAS OR OIL FOR FUEL, add....... 2 cts.

The hazard of natural gas has of late years been better understood, and the great number of fires due to its use when first applied for heating, cooking, etc., has been largely cut down. Meanwhile, the insurance companies stood in the breach, as it is always their misfortune to do in the case of all new hazards, and paid for all mistakes and lack of proper precautions.

29. HIGH WINDS—If city subject to high winds, add according to hazard, say .... 5 cts.

30. PREVIOUS FIRE RECORD—This schedule is based on the supposition of a normal fire record of the city or town to be rated. If, however, the previous fire record of the place has been abnormal and disastrous, a higher basis rate for a standard building in such place should be made, in accordance with such record. An average annual loss on mercantile risks for the previous period of five years of not exceeding $5 for each $1,000 of insurance or value, as shown by the books of the principal insurance agents, may be regarded as normal. For

each dollar of loss or part thereof, in excess of $5 per $1,000 of insurance on Mercantile Business, 20% should be added to the above basis rate of a standard building in the city to be rated.

(Twenty per cent. of the key-rate to be the maximum increase or addition for any one sweeping fire or conflagration.)

For example, if the average annual fire loss for the previous five years has been at the rate of $7 per each $1,000 of insurance, and the rate of a standard building in such city has been ascertained, as above, to be 40 cents, 40% thereof, or 16 cents, should be added, making 56 cents as the basis rate of a standard building.

By way of illustration, let us suppose a town whose insurance on mercantile values—buildings and stocks—amounts to $20,000,000. If its average losses amount to $100,000 per annum, they would be at the rate of $5 per $1,000 of insurance, or normal. If the average rate be 1% the premiums would be $200 000, and the loss ratio 50%; but, let us suppose that instead of $100,000 losses per annum, the annual loss is $140,000. This would be at the rate of $7 per $1,000 or $2 per $1,000 in excess of normal, and 70% of the premiums at 1%. The schedule would increase the rate 20% for each dollar in excess of five, or 40%, and, at a rate of 140, the premiums would be $280,000 on which the $140,000 of losses would be 50%. Mercantile values of a city and the annual fire loss can be estimated with approximate correctness by an intelligent expert, assisted by the local agents or by the Companies. Even where not possible to get accurate figures, however, anything gained under this item of the schedule will be a practical improvement on present methods, which ignore this feature of previous fire record altogether.

REDUCED FIRE WASTE—There should be a reduction, also, of 1% of premium rate for each 1% decrease in fire waste below 55%, not exceeding 15% on a three year period. (See page 123.)

31. **EXCEPTIONAL FEATURES OF CITY.—If the city or town has unfavorable features [not provided for in the schedule] which are exceptional, and which should be**

provided for in the general city charge as affecting all structures in the compact portion, charge according to danger.. ....

NOTE.—The only supply water-main for an important Southern city, for example, crosses a wooden railroad bridge, the locomotives using wood for fuel. An important Western city was dependent, at one time, upon the working of a telephone to secure water for fires. It did not work and a conflagration was the result. Such faults should be roundly charged for. The Galveston, Texas, water supply was cut off by the great storm of September, 1900. The water supply of an important city in North Carolina depends upon a single fireman some distance from the city and an accident to him would cripple the service. It is strange that such contingencies are so frequently overlooked.

DEDUCTIONS.

32. CHEMICAL ENGINES ON WHEELS.—For each deduct (not exceeding 5% in all) from foregoing total...... 3 %

These are admirable in their way, and where used with intelligence by the chief of the fire department frequently save immense loss to underwriters, which would otherwise result from throwing large quantities of water on damageable stocks, like hardware, millinery, etc. They are gradually winning their way, so that most of the practical fire chiefs are using them.

33. AUXILIARY STEAMERS—Where a city has gravity water-works, with head sufficient to throw over highest building, or direct pressure system, and sufficient hose for six streams, if one or more steam engines, maintained in good condition, are also provided, deduct................. 5 %

It is too frequently the case that municipalities with gravity water-works, or with a direct pressure system, fail to provide fire steamers, or, having them already, dispense with them upon securing the direct pressure system. Those towns which keep them should have recognition of them.

34. HOOK AND LADDER TRUCKS—One to every 4 steamers............ .... 5 %

RESULT—The Basis or "KEY-RATE" for a Standard Building in said city..................................

(For illustration see page 59.)

This basis rate once obtained, in this manner, will be the "Key" Rate for rating all buildings in the city, and so ascertained, it is only necessary, thereafter, to use the following schedules for rating all structures.

SCHEDULE FOR "NON-FIRE-PROOF" BUILDINGS.

KEY-RATE—The key-rate of the city is intended to measure the average rate of a standard building in the city; but such a building would receive further deductions later, for proximity to hydrants on an adequate water main, and for private fire appliances 155, 156, etc.

The various items of the schedule are numbered and arranged in their numerical order, and they will, therefore, be explained in the order of their arrangement, as follows:

38. WALLS (other than "Party," for which see No. 40) —If the two side or bearing walls (or either of them —charge for worse but not both), vary in thickness from standard construction, add according to deficiencies.

This may be computed by charging for variation of the wall from the standard by estimating the average thickness of the standard required for a building of equal height and charging at the rate of 2 cents for each deficiency of 4 inches of average thickness or fraction thereof. (IF BUILDING OVER 4 STORIES HIGH, DOUBLE THE CHARGE.) For example, the average thickness of a four-story wall according to standard would be 12 plus 16 plus 20 plus 24, equals total 72 inches, averaging say 18 inches throughout. If the wall should be 12 inches average thickness, 4 cents should be added. If two independent walls adjoin, 4 inches may be deducted from the average of these requirements.

The standard building of the schedule is seldom to be met with, even in cities with admirable building laws. Most builders and architects regard a rule requiring an increase of four inches in thickness for each story to the bottom as too severe a requirement. Such a building, however, would be calculated to confine a fire within its own four walls, and we do not hesitate to express the opinion, after long consideration of the matter, that all buildings in the compact portions of cities should be constructed in this manner. In isolated locations, where the owner of land has no neighbors, he may well claim that he should be allowed to build as he pleases; but proper consideration for community interests requires that, in cities and towns, each property-owner should be required so to build that the burning of his property would not necessarily destroy that of his neighbor. Whatever hardship this may be to him is more than offset by the great advantage of having his neighbors held to the same rule, in view of the fact that they outnumber him a thousand to one.

The schedule recognizes the merit of a wall such as is required by the New York building law, however, as it will be found the charge for variations from the standard are very light. A wall 12 inches in thickness, for the uppermost 15 feet, increasing 4 inches in thickness for every 15 feet below to the foundation, is a good wall and should not be penalized more seriously than the schedule provides.

39. WALLS, on buildings over three stories high, if average thickness be less than 12 inches (no portion to be less than 8 inches), charge according to danger and adjoining buildings, not less than..................... 8 cts.
(This in addition to No. 38.)

It will be observed that this section provides for a wall which by reason of a number of thick sections making a high average of thickness might yet be weakened by one or two sections only 8 inches in thickness, as is sometimes the case.

40. PARTY WALLS should average 4 inches thicker than independent walls, and should be 16 inches for the top story, increasing 4 inches for each story to the foundation; no portion to be less than 12 inches. For EACH INCH of deficiency of the average thickness of the wall to be rated (charge for worse but not both), from the average thickness of a standard wall, charge (If building is over four stories, double the charge.)....... 1 ct.

For example, a standard four-story party wall would be 16 plus 20 plus 24 plus 28, equal total 88, or average 22 inches; and if risk is 18 inches average thickness, 4 cents should be charged.

Party walls should be thicker than independent walls, as they are laid with less care. Two independent walls would be "brought to face" on both sides and properly bonded; but party walls may be filled in with "bats" and may have air spaces, and should be, as is here required, at least four inches thicker than independent walls.

41. PARTY WALLS—If party wall be less than 12 inches thick for any portion thereof, charge according to danger and adjoining buildings, not less than......... 10 cts.
(This in addition to No. 40.)

This requires a charge for any section less than 12 inches thick. An 8-inch party wall would bring the ends of the floor beams of the two buildings too near together.

NOTE.—In buildings where wooden beams or girders are used, the ends of beams should be protected by iron anchor boxes or tin, to prevent charring if in proximity to flues. The timbers should also be chamfered off or cut on a bevel of 3 inches, so as to be self-releasing in case they are burned through, permitting them to fall without tearing out the walls. At least one beam in five, however, should be tied to the walls, to strengthen the building. This may be accomplished by a projecting tongue or lug on the bearing corresponding with a groove in the lower

side of the beam, which would lift off the lug in case the beam should fall. If these provisions are made a deduction may be made. See item No. 178.

42. WALLS—If walls not parapet through roof, at least 12 inches, and coped, add for each exposed side.... 5 cts

NOTE.—If the building be higher or lower than the adjoining building by a difference of 12 inches or more, without openings in excess height—unless openings be protected with approved tin-covered wood shutters, and without wooden cornices or exposed woodwork, no charge need be made for absence of parapet. If parapet exceeds 12 inches in height, a deduction will be made at No. 126.

If it be claimed at this point that a parapet wall should properly be three feet high, it can be answered that such walls are rarely built, and to charge for deficiency at this point would entail an unnecessary amount of labor in ninety-nine risks out of a hundred. The greater height of wall is provided for by deduction, No. 126, so that it will receive recognition in the few instances in which it is to be found, without adding to the labor of the great majority of buildings not so protected.

43. WALLS—If the brick are not hard burned and of good quality, or if the mortar be of poor quality for want of sharp sand, etc., an additional charge should be made of not less than.................................. 20 cts.

This charge is necessary and should be intelligently made. In many sections it is customary to charge all buildings a higher rate to cover faults of bricks and mortar incident to the majority; but this is unjust to those property-owners who are exceptions to the rule. In Brooklyn, for example, for many years the market for "pale" or poorly burned brick because of a poor building law, if an owner bought well burned bricks, with sharp sand, and erected a proper structure, and his enterprise should not be recognized, there would be no encouragement for such a public-spirited citizen, other than that of self-approbation.

44. IRON FRONTS—For each iron front or side not backed up solidly with bricks and mortar, charge .... 5 cts.

This is an important charge and it is safe to make it, unless correctly informed as to the facts, so general is the prevailing negligence with regard to the precaution of filling in the ironwork. Even when backed up with bricks and mortar an iron front should be charged for as a deviation from a brick wall. This is provided for in the following charge.

45. IRON FRONTS—If so backed up, charge........ 2 cts.

46. IRON FRONTS—If building adjoins other iron fronts, making one continuous iron frontage, add for EACH IRON FRONT in the continuous line.................... 2 cts.

NOTE.—Buildings having a continuous iron frontage are not only liable to be ignited by the raised temperature of the iron front of the one on fire, but the connection between the division walls and the iron front is not always thoroughly cut off where the front connects with brick side walls, nor can defects always be discovered, which is one reason for the extra charge.

On the night of the great fire in Worth street, New York, January 17, 1879, the rapidity with which the fire proceeded from one building to another, apparently without any intervening obstacle, was amazing. The mystery was solved later, when it was found that the dividing brick walls were not carried out to the iron front in the attics, the most dangerous portions of the buildings, so that there was nothing to prevent the passage of flame from one building to another throughout a block which had always been regarded as composed of a number of distinct and separate risks. A loss of millions of dollars was the result of this culpable negligence on the part of the builders and architects.

47. ROOF—if approved composition covered with gravel, add.. 1 ct.

It will be observed that a metal roof is standard. An approved composition, covered with gravel, approaches it in safety.

48. ROOF—If slate roof, add...................... 2 cts.

Slate roofs are objectionable not only because the slates are liable to crack in case of fire, allowing a draft, but also because they are liable to fall and injure firemen, interfering with their efforts to save the structure.

49. ROOF—If shingled, add........................ 15 cts.

50. IF MANSARD ROOF WITH WOODEN FRAME, even though covered with slate or metal, for 3 or 4 story building, add for mansard one side........................ 15 cts.
For each additional side................................ 5 cts.

51. For mansard, as above, on a building of five stories or more, add for one side.............................. 20 cts.
For each additional side .... 10 cts.
(This in addition to height charge, 63, 64, 65.)

A wooden mansard roof has been aptly compared by an experienced fire chief to a lumber-yard placed out of reach of the fire department. It is, of course, objectionable in proportion to its height above the grade, hence the charge for height.

52. ROOF SPACES, BLIND ATTICS, COCK-LOFTS, ETC.—If hollow air space left next roof, plastered or ceiled below, add for each vertical foot................ 3 cts.

If pitch roof or slanting roof charge for maximum height (not exceeding a total of 10 cts.)

If said air space communicates with elevator or other shafts connecting it by air drafts with the main building, see No. 153.

Roof spaces, it will be conceded, are decidedly objectionable. They are usually constructed with exposed woodwork, and fire gaining access to them soon reaches the unextinguishable stage. They are found more frequently in the South than in the North, to give relief from summer heat. They should be cut off from all the vertical drafts, like staircases, elevator shafts, etc.

53. FLOORS—If not standard, but of two thicknesses of floor plank, and less than 3 inches thick, or if one course of 2 inch plank, add................................ 3 cts.

If the two courses of floor plank cross each other diagonally, which would prevent co-incidence of cracks or joints, the floor would be more fire-resisting and waterproof.

54. FLOORS—If single, i. e., with only one course of floor plank less than 2 inches thick, charge............... 5 cts.

55. FLOORS—If floor beams or joists be less than 3 inches (say 3 x 10) thick, charge in addition to 53 or 54 3 cts.

This charge is an important one and, in some cities, should be larger, not only on account of the small carrying capacity of the floor, but also on account of the brief resistance to flame which smaller floor beams than 3 x 10 (practically two-inch plank on edge) present. In some sections this plan of construction is so common that it is safe to assume and charge for the fault in the absence of knowledge, if investigation or inquiry fails to determine the facts.

If first floor "fireproof or fire -resisting," according to standard, see deductions, No. 119, etc.

56. WOODEN CEILING—If ceiling is sheathed with wood or strawboard or other combustible material, add according to hazard, not less than 5 cents for one story and 3 cents for each additional story..................

57. WOODEN SHEATHING—If side-walls are sheathed with wood, wood lath, furring or other combustible material (no charge for dados), charge for one story 5 cents and 3 cents for each additional story......

57a. Cloth or paper ceiling or siding on wooden studs, each story, 10 cents.

Few property owners appreciate the difference in fire-resisting properties between the old-fashioned plaster, and wooden ceilings with varnished surfaces. Ordinary plaster, even on wooden laths, will resist fire for a much longer time than most persons suppose. It is for this reason that broken plaster is penalized by a fault of management charge, No. 144.

58. AREA—If ground-floor area in excess of 2,500 square feet and not exceeding 5,000 square feet, add for each 1,000 square feet in excess of 2,500 square feet..... 1 ct.

59. AREA—If ground floor exceeds 5,000 square feet, add for each 1,000 in excess of 2,500 up to 10,000:

In buildings not over 3 stories high.................	2 cts.
" " over 3 stories and not over 6...........	3 cts.

60. AREA—If ground-floor exceeds 10,000 square feet, add for each 1,000 or fraction thereof in excess of 2,500:

In buildings not over 3 stories high.................	2½ cts.
" " over 3 stories and not over 6	5 cts.

(Not exceeding a total of 200 cents.)

62. AREA—If building exceeds 6 stories in height and 10,000 square feet of ground floor area, double the area charge..

(Not exceeding a total of 300 cents.)

If building is of standard fire-resisting construction throughout, one-half the area charge only to be made.

ONE-STORY BUILDING, one-half the charge for three-story.

TWO-STORY BUILDING, two-thirds the charge for three-story.

IF CURTAIN, CROSS OR DIVISION WALLS, sub-dividing and strengthening the building, even though with arched openings or door ways, deduct 10 per cent. of area charge for each wall so dividing the risk, not exceeding a total deduction of 40 per cent. of the area charge. Communications with adjoining buildings unprotected, charge for area both buildings and allow for the division walls.

SINGLE OCCUPANCY—If only one tenant (outside of dwelling and office tenants) twenty per cent. (20%) of the area charge may be deducted. (N. B.—Single occupancy, as a rule, involves, with undivided responsibility and management, greater care and cleanliness and, also, less crowding of merchandise on floors by piling or tiering.)

These charges are framed recognizing the fact that area, while in itself objectionable, is especially so when found

in connection with height. Fires in buildings of large area and excessive height combined are rarely extinguished, when once started, by even the best fire departments, and are generally "conflagration breeders."

Division partition walls are recognized as deserving of lower rates for two reasons: First, because they deaden the fire, on the same principle that bricks mixed with the coal in a furnace would retard combustion; and, second, because they afford barriers and corners, compartments or bulkheads, so to speak, into which the fire department can crowd a fire and possibly extinguish it.

63. HEIGHT—For fifth story, add.................. 5 cts.
64. HEIGHT—For sixth story, add.................. 10 cts.
65. HEIGHT—For seventh story, add.............. 25 cts.
66. HEIGHT—For each story in excess of seven, add. 40 cts.

These charges cumulative; for example, a seven story building would have 40 cents added. If any story double height, charge for two.

NOTE.—If building is of standard construction throughout it may be seven stories high without extra charge in a fire department town whose key-rate does not exceed 30 cents.

66a. For eighth story on standard building.......... 24 cts.
66b. For ninth story on standard building.......... 40 cts.

Those who think larger height charges than the above should be made must not overlook the fact that the provisions of Nos. 38, 39, 40 and 41, as to wall requirements, together with the area charges 62, etc., will make the rate sufficiently high for tall buildings, especially if not exceptionally well constructed.

While the charges for the sixth, seventh and higher stories may be regarded by some as severe, there are few underwriters who would not prefer to let seven-story buildings of ordinary construction go uninsured at prevailing rates.

67. ELEVATORS—If not in shaft, according to the standard, but in hall-way or enclosed in lath and plaster partitions, or with self-closing traps at each floor, charge.. 5 cts.

67a. Cut off by brick or fire-proof shaft, but doors not standard, or with wood sills, or if windows in shaft are not wire glass or otherwise fire resistant, charge.............. 3 cts.

68. ELEVATORS—If open from floor to floor and varying from above, charge.......................... 12 cts.

69. ELEVATORS—If the shaft is sheathed or lined with wood (unless covered with tin or galvanized iron, in which case half charge), charge...................... 15 cts.

If elevator and stairway are combined and contained in the same shaft or opening, make only one charge for the two. If more than one elevator, charge for worst and add one-fourth charge for each in excess of one. If elevators are provided with traps which are not automatic, or traps closed only at night, NO DEDUCTION CAN BE MADE FOR THE SAME. If bottom of elevator shaft used for closets, see No. 141.

70. ELEVATORS—One-half the above charges for elevators in buildings otherwise standard throughout, or in buildings occupied exclusively FOR OFFICES.

Nothing so weakens the fire-resisting properties of a building as unprotected openings from cellar to roof, such as unenclosed stairways, open elevator shafts, well-holes, etc. They insure the rapid progress of fire throughout the structure on the same principle that a stovepipe promotes combustion in a stove; and there is no excuse for such faults in mercantile buildings. Even when enclosed in ordinary lath and plaster partitions, with wooden doors at each floor, combustion may be retarded sufficiently to enable the fire department to arrive in time to save the building. Every minute gained when a fire starts increases the probability of extinction. In this view, it is a grave question if the protection of these communications from floor to floor be not more important than the structural composition of the floors themselves. It is possible to protect an elevator shaft even after the erection of a building, by metallic lath and plaster.

71. STAIRWAYS—If not enclosed according to the standard, but in separate hallway or shaft enclosed by lath and plaster partitions with self-closing spring-doors at each floor, or automatic trap-doors in floors, charge 7 cts.

(If charge has been made for 67, 68 or 69 one-half charge—halve the smaller charge.)

71a. If stairways are simply provided with traps which are closed only at night, charge........................ 12 cts.

71b. Cut off by brick or tile hallways, but doors not iron or metal covered, or if lights in panels are not wire glass, or otherwise fire resistant, charge.................. 5 cts.

71c. If stairs in the above case be fire-proof with incombustible treads, charge only........................ 2 cts.

72. STAIRWAYS—If the enclosure is of wooden partitions instead of lath and plaster, with self-closing doors at each floor, charge.............................. 10 cts.

(If charge has been made for 67, 68 or 69 one-half charge—halve the smaller charge.)

73. STAIRWAYS—If open staircases from floor to floor throughout building, not cut off by partitions with self-closing doors, charge according to hazard, not less than 15 cts

(If charge has been made for 67, 68 or 69 one-half charge—halve smaller charge.)

If more than one stairway charge for worst and add one-fourth charge for each additional.

No charge under these stairway items for *buildings occupied exclusively for offices or dwellings above first story when stairway does not open into store.*

There would be no charge, of course, for stairway in standard building.

It will be observed that provision is made for smaller charges for each subsequent breaking of a floor by staircases, elevators, etc., on the principle that while two holes in a fence are worse than one, they are not twice as bad.

74. WELL-HOLES, HATCHWAYS, ETC.—If not provided with self-closing traps, add, according to size, for EACH FLOOR PIERCED, not less than.................... 5 cts.

If well-holes have approved traps, half charge.

Make full charge for each, for each floor. No allowance for traps which are not automatic in every particular and which do not fit openings closely.

Probably no better illustration of the difficulty of extinguishing a fire in a building with well-holes is to be found than in the case of the Horne Building, in Pittsburg, which, although of fireproof construction, failed to protect the merchandise in its various stories, which was burned as effectually as if in a stove.

75. WOODEN CHUTES, DUMB-WAITERS, (unless enclosed in brick with standard doors), VENTILATING SHAFTS, BELT HOLES and openings through floors for steam and water pipes, etc., tend to the rapid spread of fire throughout the building and should be charged for according to size, not less in any case, for EACH AND FOR EACH FLOOR PIERCED, than......................... 2 cts.

If dumb-waiters are in brick shaft, but the doors to floors are not sheet iron or metal lined, deduct only 50% from charge in order to compel their being made standard.

NOTE.—No charge need be made for openings for steam and water pipes if the space around the pipes is filled in with mineral wool, asbestos or other incombustible material, or otherwise arranged to prevent draughts and leakage of water to floor below.

A fire in the "fire-proof" Mills Building, New York, passed from one story to another through the channels for electric light wires and pipes. Such communications from one floor to another, especially where dumb-waiters are used, should always be charged for.

Dumb-waiters should be in a fire-proof shaft, with standard doors at each story. This is required by the New York Building Law.

In the case of the fire in the Cammeyer Building, January 18, 1899, the fire went rapidly from one story to another through dumb-waiters with wooden shafts and wooden doors, which had been used for sending goods from one story to another. The firemen could not understand the matter until the fire had revealed the fault. It is a grave question whether such concealed avenues for fire are not much worse than well-holes, which the firemen know they must guard. An illustration of this was to be found in the fire in Bloomingdale Bros.' store, in New York, where the fire department held the fire at the well-hole, knowing the danger, although the same men failed to hold the fire in the Cammeyer Building owing to the fact that they were ignorant of these concealed passages for flame.

76. SKYLIGHTS—If more than three feet square (nine square feet), add for each nine square feet or fraction thereof in excess (not exceeding a total of 25 cents) 2 cts.

(If metallic frames and heavy deck or prismatic glass or wire glass, no charge. Glass should be ½-inch if through roof and ¾-inch if through floor.)

77. SKYLIGHTS—If covered above and below with strong wire netting, one-half charge..................

78. SKYLIGHTS—If skylight is monitor style, i. e., box form with raised sides, charge for square feet in sides as well as top....................................

It is so easy to construct these in such manner that they will not afford an entrance to burning brands, by wire glass or wire protection, that they should be roundly charged for. A large skylight of ordinary construction may readily be as objectionable as a shingle roof.

79. CORNICES—For wooden cornices, wooden dormer windows, cupolas, monitor roofs, large wooden signs, or other exceptional features, add according to hazard, taking into account height of building and nature of exposures, not less, however, in any case than............ 3 cts.

This charge is probably self-explanatory.

80. WOODEN AWNINGS—If building has wooden awnings, and is only one story high, so that awning would endanger roof, add............................ 10 cts.

81. If in non-fire department town, charge from.... 10 to 20 cts.

82. WOODEN AWNINGS—If building is two stories or more high (in which case there would be less danger to roof timbers), charge............................ 1 ct.

83. If in non-fire department town, charge from...... 5 to 10 cts.

The difference in charge for wooden awnings on one-story buildings is due to the fact that they are generally framed into the roof timbers, and an entire block might in this way get on fire, as was the case some years ago in Pensacola, Fla., where a block of one-story brick buildings, supposed to be exceptionally good risks, burned from this cause, and one company lost $18,000. They are less dangerous, of course, in higher buildings, where the framing of the awnings would be in the brickwork of the building, and would have no connection with the woodwork thereof.

84. LIGHTING—If by electricity, with system and installation in compliance with National Board rules and specifications, add.......... 2 cts.

85. If electrical installation not in compliance with board rules, or in unsafe condition, see No. 154.

For swinging gas brackets, see No. 142.

No matter how safe the electric light installation may be supposed, it is worth two cents in the rate; and if unsafe it is difficult to place any proper charge upon it. The penalty of 25 cents (154) is not too high.

86. LIGHTING—If by kerosene, add.......... 2 cts.

(No charge if charge of two cents or more has been made for electric light.)

Any other system of lighting must be subject to approval of Local Board of Underwriters and charged for by rule.

At the Hartford convention, which passed upon the Universal Schedule, the point was aptly made by one of the delegates that inasmuch as electricity and kerosene were charged the same rate, they should be treated as interchangeable; and, logically, if half the building should be lighted by electricity and the other half by kerosene, there should be one charge for the whole building. The convention took this view of the matter.

87. HEATING—If by furnace, add.......... 3 cts.

88. HEATING—If by furnace with metallic cold-air box and hot-air pipes through brick walls, and one register fastened open, add (instead of No. 87).......... 2 cts.

All vertical hot-air pipes should be inclosed in the brick walls whenever possible; if passing horizontally between a floor and the ceiling below, or vertically in lath and plaster partition between studs, they should be double, with an inch space between the two pipes, and the studs should be sheathed with tin. Inasmuch as it is impossible to ascertain these facts, some charge should be made for all hot-air

pipes of this character and not less than two cents should be added.

A metallic cold-air box or duct of tin or galvanized iron is essential for health as well as for safety from fire. A wooden box soon opens joints and cracks from shrinking, taking the foul air of the cellar, from damp coal, decaying vegetables, etc., and forcing it throughout the living and sleeping rooms of the house by the operation of the furnace. If property-owners could be made to realize this all cold-air boxes would be of metal.

89. HEATING—If by stoves, add.................. 2 cts.

90. HEATING—If stove-pipes through floors or hollow partitions with double thimbles or safely protected, charge for each passage from 2 cts. to.......................... 10 cts.

91. HEATING—If through partition not protected, charge at No. 140.

92. HEATING—Stove-pipes through windows, roofs, etc., protected by double metal chimneys, etc., No. 140.

93. HEATING—Stove-pipes through windows, roofs, etc., not protected by double metal chimneys, etc., No. 140.

94. HEATING—If stove-pipe enters bottom of flue vertically, charge at No. 140.

95. HEATING—If stove-pipe enters chimney in attic or unused room, charge at No. 140.

96. HEATING—Natural gas or oil fuel, with approved pressure regulating appliances, add...................... 5 cts.

97. CHIMNEYS—If not built from ground but resting on beams or brackets, charge for each................. 5 cts.

NOTE.—There should be not less than six courses of brick at the bottom, or three courses with a flagstone.

These would get an additional charge if less than 8 inches thick, under No. 98, and if of poor bricks and mortar would be charged again under No. 100.

98. CHIMNEYS—If inadequate for service required or with flue-walls less than 8 inches thick—"half brick chimneys," unless latter are lined with pipe of burnt clay or cast iron, charge from 5 cents to.............. 50 cts.

99. CHIMNEYS—If chimney rests on attic floor beam or roof joists, charge (in addition to No. 97)........... 25 cts.

100. CHIMNEYS—If constructed of poor bricks or mortar, charge not less than (this is in addition to No. 43)... 20 cts.

101. CHIMNEYS—If cement or terra cotta chimneys, add... 50 cts.

102. STREET—If street on which building fronts is unpaved or otherwise inaccessible, especially during wet seasons, for fire department, add, according to hazard, not less than.. 10 cts.

(If no fire department, no charge for this.)

103. STREET—If less than sixty feet wide from building to building (*i. e.*, including sidewalks), but not less than 50, add (unless opposite side of street is vacant) .... 2 cts.

104. STREET—For each 5 feet less than 50 in width, unless opposite side of street is vacant, add............. 2 cts.

NOTE.—This charge for narrowness of street on which the building is located is necessary in addition to any charge that may have been made in the basis rate in a city of narrow streets, which charge is intended to cover the conflagration hazard; the charge on each building for inaccessibility of street to fire department is necessary even where the extra city charge has been made. In St. Joseph, Mo., or Mobile, where the majority of the streets are from 40 to 50 feet in width, the rate of a risk, even on a street 120 feet wide, by reason of the exposure of all buildings behind it, rendering it more liable to burn by a sweeping conflagration, should be greater than that of a building which fronts on a narrow street lying between two 120-foot streets, in a city like Washington or Salt Lake, where only the charge for the risk itself is necessary.

105. OVERHEAD WIRES, TELEGRAPH, ETC., on poles in front of building in sufficient number to interfere with operations of fire department, charge according to quantity not less than.................................... 2 cts.

These interfere seriously with the operations of the fire department, especially in the case of water-towers and ladders.

106. NUMBER OF TENANTS (other than office and dwelling tenants)—For each tenant in excess of one, add 2 cts.

This is intended as a personal charge, only, to cover the average moral hazard, carelessness, negligence, etc., which increase in proportion to the number of tenants.

The physical hazard of additional tenants by reason of extra quantity or cubic feet of material, stock, etc., will be provided for by other charges, area, height, etc., and by the charge for stocks above or below the grade floor, and area charge (Note to No. 62), where it will be seen discrimination is made in favor of single occupancy buildings.

As explained, this clause is not intended for the physical hazard of a tenant, but as a personal charge. Of course, there is a personal equation in the case of every tenant of a building, and each additional human being with interest in collecting insurance may be said to increase the moral hazard. On this account, it has been argued that the charge for every tenant should be at least 5 cents, but this would increase the rate to an uncollectible figure, and, moreover, would be unjust, as we think the following considerations would demonstrate:

In fire department cities less than 5% of the losses are total. We think it will be conceded that the majority of

incendiary fires would result in total losses. With the choice of time and circumstance the incendiary is almost certain to succeed; his fires usually take place in the night, and he can so contrive them as to insure totality. This being so, incendiary fires, or at least a very large majority of them, would be found in the total losses and, therefore, must be less than 5% of the whole number of fires. We think few underwriters would claim that one-half of the "total" fires were incendiary; if this be a fact, one cent would be enough on a 50 cent risk and two cents on a 1% risk. These supposititious figures are confirmed, we may add, by the tabulation of the causes of fires made by taking the opinions of careful adjusters, *expressed at the time of investigating and adjusting the loss*, in more than 20,000 fires.

106a. For each manufacturing tenant in addition to the highest rated one (which is charged for in No. 128) add ten per cent. (10%) of the first column charges of such additional tenants.

As already explained, the ignitibility and combustibility hazards of occupancy are measured by the first column charge in the table; the addition, therefore, of 10% of this first column charge for each manufacturing tenant in excess of the highest rated one (which is charged for specifically at No. 127) will adjust the rate to the compound hazard of a number of manufacturing tenants.

This charge and 106b are intended for rating mercantile buildings occupied in part for light manufacturing purposes, such as are found in the larger cities.

106b. MANUFACTURING RISKS—Charge one-fifth of .01 for each operative employed in excess of 10, not exceeding a total of 25 cents in risks where the first column charge does not exceed 25 cents, and double this amount in wood working and other hazards where the first column charge exceeds 25 cents, but not exceeding a total of 100 cents.....

In a building with a number of tenants the charge should not be doubled for all of the operatives, but only for the number of operatives of the woodworker or other tenant whose first column charge is in excess of 25 cents...

It is believed this charge will be self-explanatory, as intended to measure the extent of processes according to the number of operatives.

107. AGE OF BUILDING—If over 20 years, add.... 2 cts.
If building is in poor repair, charge at No. 144.

This is intended to measure the hazard of age in all buildings as an average, and would probably cover the cases

which are not specifically measured as to variations from standard, etc.

108. FRAME REARS, EXTENSIONS, ETC.—According to danger and number in block, not less than.... 10 cts.

If frame portion is protected with approved metal covering, halve charge.

NOTE.—This is very important, as entire brick blocks are frequently destroyed by reason of small frame rears and extensions. See diagram of Sullivan, Ind.

Brick buildings with frame extensions may often prove no more desirable or safe than frame buildings.

109. STONE PIERS, STONE COLUMNS, PILLARS, or brick piers with bond stones, *carrying important weights, especially if supporting beams or girders in the interior of buildings, in basements, cellars, etc.,* charge according to number not less than.................... 5 cts.

(Stone columns subjected to fire and water are certain to disintegrate and wreck the building if located in the interior. In exterior walls they are not, as a rule, dangerous.)

This charge is an important one. Stone is a dangerous building material, especially so in the case of columns.

The danger of bond stones in piers is that they disintegrate under the action of fire and water, and, the moment they crack, fail in their purpose of distributing the superimposed weight over the entire pier and throw the excess of it on a comparatively small area, which splits the brickwork and results in the fall of the pier if not of the entire structure. Strangely enough, they are advocated by many builders and architects, who have in mind only the strengthening of the pier for weight-carrying purposes, overlooking the serious danger of the failure of the bond stones and cap stones for that very purpose in case of fire.

The burning of the Cammeyer building, in New York, January 18, 1899, showed how utterly unreliable, in case of fire, are bond stones and cap stones, even if of granite of extra thickness. They ought to be prohibited by law, and would be under the New York building law but for the fact that the stone interests opposed their exclusion.

The best bond for a pier is a cast-iron bond, with holes for the incorporation of the mortar. Cast-iron will not rust to the point of danger and will answer the purpose admirably.

110. UNPROTECTED IRON COLUMNS—Cast-iron, 10 cts.; steel or wrought-iron, 15 cts....................

The greater charge for steel or wrought-iron columns is due to the greater danger of rust (see page 63) and of warping. This is in accord with the general opinion of iron experts almost without exception, and the various fires in New York, especially that of the Appleton Building, in Bond Street, a number of years ago, and of the later fire in the Cammeyer Building, already referred to, where 6-inch cast-iron columns stood the heat better than the bond stones in piers, justify the difference in rate.

111. STEAM BOILER—(except for heating) Inside first floor or basement, .05; upstairs, .10; wood shavings for fuel, 1.00..

If boiler in fire-proof room cut off in approved manner, no charge.

112. POWER—Steam, electric, gas or gasoline for running shafting, charge according to hazard and Board Rules. If unsafely arranged, charge under FAULTS OF MANAGEMENT.

116. TOTAL DEFICIENCIES PLUS KEY-RATE..........

DEDUCTIONS FOR EXCEPTIONAL CONSTRUCTION, ETC.

117. If no cellar or basement, deduct ......10 % of above total.

118. SMALL RISKS—If building is not over 1,500 square feet of ground floor area, say 25x60, and not over three stories high, deduct..10 % " "

119. FLOORS—For tin or sheet-iron between floors, deduct from schedule rate obtained an amount equal to............................ 5 % " "

120. FLOORS—If water-proof, deduct..... 2 % " "

121. FLOORS—If water-proof, arranged with waste-ways and scuppers and inclined to carry off surplus water thrown by fire department to sewer or street, deduct................ 5 % " "

121a. If floors exceed 3 inches in thickness deduct 1% for each excess inch (this in addition to 119, 120 and 121).

122. FLOORS—If the grade floor be fire-proof, protecting the upper portion of the building from fires in the basement or cellar, and the communicating stairway to main building thoroughly cut off, deduct............10 % " "

123. FLOORS—For each fire-proof floor above the grade floor, deduct.................. 5 % " "
(Not exceeding 40% in all.)

124. CEILINGS AND PARTITIONS—If of incombustible material throughout or plastered on metallic studs and lathing, the lathing to have a good key for plaster, (no deduction for this in fire-proof construction), deduct........10 % " "

125. CEILINGS, PARTITIONS AND FURRING—If metallic lathing on wooden studs, deduct..................................5 % of above total.

NOTE—If the main "fore and aft" partition separating halls containing stairs and elevators from the stores, be of brick or metallic lathing, etc., with protected openings it would save building from charges 67, 68, 69, 70, etc., as to elevators and stairways.

126. PARAPET WALLS—If carried more than 12 inches above roof on all exposed sides, and coped or covered, deduct for each foot in excess of one (not exceeding 3% in all)........1 % " "

NOTE.—Parapet walls which are three feet or more in height are improved if pierced for the use of hose.

TOTAL DEDUCTIONS.................. % (of No. 116)

These are treated as deductions for two reasons: First, they are of exceptional occurrence and save the time of considering them in at least 95% of all risks, which would be lost by charging for their absence as a deficiency. Second, treating them as deductions prevents loss to the companies if overlooked by rating experts. The property-owner may be relied upon not to overlook them. This will further explain the apparent inconsistency of making deductions for exceptional features of risks notwithstanding the fact that they have been stipulated for in the requirements for a standard building. It is believed that the two reasons given for recognizing them by deductions will be regarded as sufficient; while, on the other hand, it would probably be conceded that it is best to make the description of a standard building as nearly perfect as possible, in order that it may be educational to an owner who contemplates building as a guide for such construction as will secure for him the lowest rate, either by escaping charges for variations from standard or by securing deductions for exceptionally good features.

127. RESULT—RATE OF BUILDING **UNOCCUPIED.** cts.

OCCUPANCY, add the figure named for the occupancy in the first column of the alphabetical table of occupancies, p. 143, selecting, in case there be more than one occupancy, the highest rated one for such addition, to get the occupied rate of building; retail drugs, for example, add 10 cents, while cigars and tobacco add only 5 cents; the 10 cent charge, therefore, should be selected.

128. RESULT—RATE OF BUILDING **OCCUPIED**....

Subject to any deductions to which the risk may be entitled in the list, Nos. 155, 156, &c., page 45..............................

129. RESULT—**NET RATE** OF BUILDING **OCCUPIED, UNEXPOSED**..................................

130. **EXPOSURE**—Add according to hazard*..........

130a. CONFLAGRATION HAZARD due to congested business district..

Note.—Charge No. 27 in the City Schedule is intended to cover the danger of a sweeping fire liable to destroy mercantile district, while the charge here refers merely to the conflagration group found in some cities, such as New York, Pittsburg, Philadelphia, *et al*, due to high and large area buildings, combined with deficient street mains, etc.

131. RESULT—**NET RATE** OF BUILDING **OCCUPIED AND EXPOSED**..............................

131a. AUTOMATIC SPRINKLERS—(See rule page 51).

DEDUCT FOR..% CO-INSURANCE—(See rule p. 52)

On buildings in fire department towns, for 80%.............. ... 15% of above total.

On buildings in non-fire department towns, for 80%..... .... 7½% " "

For explanation of these percentage deductions see page 108.

132. RESULT—RATE OF BUILDING OCCUPIED, **WITH.....% CO-INSURANCE** ....

Note.—To secure deduction for co-insurance the percentage co-insurance clause must be attached to policy.

ADD FOR ADVERSE LEGISLATION, taxation, etc., No. 136 to No. 139, p. 42... ....

ADD FOR FAULTS OF MANAGEMENT, if any, No. 140 to No. 154, pp. 42–43...........................

FINAL RATE OF BUILDING..............

To Obtain Rate on Stock.

Rate of building occupied, No. 128........... cts.

Deduct a sum equal to one-fourth of the deficiencies of the building...... ....

(*i. e.*, one-fourth of excess of item No. 127 over 25 cents) as follows—Rate No. 127 ....cents, minus 25 cents, equals ....cents; one-fourth of which...... ..... cents (deducted from No. 128) leaves............................ ...

(Extend difference into further column)

N. B.—This will be the KEY OR BASIS RATE for all Stocks in the building.

*Note.—This will involve careful consideration of many facts and conditions, the distance of the risk from the exposure, the relative area, size and height of the two buildings, the thickness of walls and the number and protection of openings, the character of roofs and other features of construction, as well as the nature of contents (a building containing oils or a stock of furniture, for example, being a much worse exposure at the same distance from a risk than one containing millinery goods) and also upon the provisions, public and private, for extinguishing fire. It should be borne in mind that to the extent a risk exposed would be damaged, even in paint or glass, the Company insuring it is carrying the risk of the exposing hazard. If, for example, a building worth $50,000, whose unexposed rate would be 50 cents, is exposed by a planing mill worth 10 per cent., whose burning would probably damage the risk, in the opinion of the rating expert, to the extent of $500, the insurance companies are clearly running the additional risk of having $500 involved in the burning of the 10 per cent. mill, and ought, therefore, to receive $50 additional premium for it. To collect this on the $50,000 risk would require an addition to its rate of 10 cents per $100, which would increase its rate from 50 cents to 60 cents. While a building of standard construction ought not only to protect its own contents from outside exposure and also prove a safe oven for the cremation of its own contents without damage to adjacent property, an exposure charge should invariably be applied in all cities where there are continuous blocks of ordinary buildings. Exposure charges are generally inadequate, especially where the exposing risk is of large area with inflammable contents, or where it is of greater height so as to endanger the risk if its walls should fall. (See Schedule for rating Exposure Hazard.)

This computation is necessary to adjust the difference in rate between a building and its stock. Obviously the difference between the two should be greater in proportion as the building is of substantial construction; in other words, the better the building the greater should be the difference between its rate and that of its stock, which is more susceptible to damage; and the poorer the building the less should be the difference, for a building of weak construction is almost as certain to be totally destroyed as the stock contained in it. Clearly, the amount added to the key-rate (or rate for a standard building) for variations of the building from standard construction is the proper guide for determining the relative weakness of the building and, therefore, whether more or less should be added to the building rate to obtain its stock rate.

From the maximum sum to be added to the rate of a standard building to obtain its stock rate, 25% of the deficiencies of the building, (viz., the rate of the building at No. 127) deducted from the amount to be added for the stock rate will have the effect of bringing the two rates nearer together in proportion as the building has deficiencies or variations from safe construction. The same result will, of course, be obtained by making this deduction from the occupied building rate, No. 128, and the difference will be the "key-rate of the building" for all stocks contained in it, to which it is only necessary to add the second column charge in the table, for susceptibility to damage of any stock, to obtain its rate. This will, of course, be subject thereafter to additions for height above the grade and to deductions for fire appliances, Nos. 190, 217, etc.

All stocks are arranged in a table of two columns. The first column contains the measure, in cents, of those features of a stock which cause fires and, when once started, bad or intense fires—liable to destroy both building and contents. The second column contains that feature of the stock which may be termed its susceptibility to damage by water, smoke, etc.

All stocks, for insurance purposes, should be regarded from these three standpoints. Those which, like wholesale drugs, stocks of furniture, oils, etc., are liable to cause

fires and to furnish fuel for intense combustion, should increase the rate of any building into which they enter, and also the rate of all other stocks under the same roof. The susceptibility to damage feature, however, is not one which makes the building worse. A stock of cutlery, for example, is peculiarly liable to damage by water or smoke, and this fact should be taken into account in fixing the rate upon it, but it does not add anything to the hazard of the building containing it. See also pp. 53, 54, 55, etc.

Add the figure in *second column* of occupancy table for "susceptibility" of the stock to be rated ....

Add if entire stock is above or below grade floor, see rule p. 58 ....

PUBLIC WAREHOUSES and Storage Stores BONDED, complying with rules of Local Board, deduct 33⅓%..... ...

PUBLIC WAREHOUSES and Storage Stores FREE, 25%

PRIVATE WAREHOUSES—Original unbroken packages only, 20%. Sales by sample only, 15%. Delivery of broken packages, 10%..................................

133................ ....

Subject at this point to any deductions to which risk may be entitled, Nos. 190, 191, 192, etc.

134. RESULT—NET **RATE ON STOCK IN UNEXPOSED BUILDING**......... ....

N. B.—MINIMUM STOCK RATE—The stock rate at this point, No. 134, must exceed that of Building at No. 129 by an amount equal to at least 20% of the second column charge in the table for the stock; if it does not, increase it to such figure.

134a. EXPOSURES* see note page 39, add according to hazard.. ......

134b. CONFLAGRATION HAZARD due to congested business district...

134c. AUTOMATIC SPRINKLERS—See page 51....

DEDUCT FOR....% CO-INSURANCE (see rule p. 52)

135. RESULT—RATE OF STOCK **WITH....% CO-INSURANCE**.......... ....

NOTE.—To secure deduction for co-insurance the percentage co-insurance clause must be attached to policy.

ADD FOR ADVERSE LEGISLATION, taxation, etc., No. 136, etc., (page 42) ....

ADD FOR FAULTS OF MANAGEMENT, if any, Nos. 140 to 154, p. 42.......................... ....

FINAL RATE OF STOCK.............

* In non-fire department towns not exceeding one-half the exposure charges to a weak building badly exposed should be added to the rate of a movable grade floor stock contained in it.

CHARGES FOR ADVERSE LEGISLATION.

136. VALUED POLICY LAW—If law applies to personal property as well as buildings, add from 50 cts to...	100 cts.
137. VALUED POLICY LAW—If law applies to buildings only, add to building rate, according to effect of law, from 10 cts. to..	50 cts.
And on stocks and other personal property therein, according to effect of law, from 5 cts. to................	25 cts.

NOTE.—In those States like Texas, where the provisions of the valued policy law as construed by the courts are especially dangerous, these charges may be too small; while in such of the remaining valued policy law States (Ohio, Wis., Mo., N. H., Ark., Del., Neb.) where the observed effect of the laws as construed by the courts is less expensive, the charge may be modified.

138. ANTI-COMPACT or other laws prohibiting agreements among Companies, add, according to increased expense of transacting business, from 2 cents to............	10 cts.

NOTE.—Equitable and discriminating rating by schedule is only possible by co-operation of Insurance Companies for comparing their experience, and sharing and lessening the expense, and is in the interest of all property owners.

139. TAXATION AND LICENSES, State and Municipal—If taxation other than on net results to company after deducting losses and expenses* and not exceeding 2% thereon, add according to amount,......................

FAULTS OF MANAGEMENT, NEGLIGENCE, ETC.

The following charges being for faults which would naturally and probably be corrected to escape the penalty, have been arranged as a *final addition after the net rate with co-insurance has been computed*, in order that the computation will not have to be reopened and deductions again calculated when the fault is corrected.

140. STOVEPIPES—If through floors or hollow partitions unprotected, charge 50 cents. If through windows or roofs protected by double metal chimneys, 50 cents, (if unprotected, 100 cents.) If pipe enters bottom of flue vertically, 25 cents. If pipe enters flue in attic or unused room..	25 cts.
140a. If floor beneath stove is not protected by metal, add..	5 cts
141. If bottom of elevator shaft is used for storeroom, coat closets or lamp and oil closets, charge................	50 cts.

This fault led to the destruction of one of the largest buildings in the country.

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* This Schedule is based upon a 5% profit above the actual cost of insuring property, and contemplates no tax other than that explained under item 139 above. Of course, if a further tax is imposed, the expense of the Companies will be to that extent increased and an extra premium must be collected. Insurance Companies do not object to paying to any State a percentage tax on the profits of their business in the State, or upon the excess of their received premiums over paid losses and expenses. It is difficult for them to see why they should be called on to pay a tax on the gross premiums of any State where the amount paid by them to its citizens in the shape of fire losses and commissions to agents, who are resident citizens, may consume all or more than the premiums received. In such case they are taxed for the doubtful privilege of leaving more money in the State than they take out of it. Charles Sumner spoke truly when he said: "A tax upon insurance is a tax upon a tax and, therefore, a barbarism."

142. Swinging gas brackets unprovided with stops, or within 36 inches of woodwork overhead, or otherwise unsafe, (ditto as to bracket lamps), for one, add not less than	5 cts.
For each additional one add 1 cent.	
143. Charge for untidiness as to rubbish, ashes, etc., especially in cellar, not less than........................	25 cts.
Packing material not in bins....................	15 cts.
144. Cracked or bulged walls, bond timber in walls, thin and worn floors, broken plastering exposing lathing, broken windows, especially on lower floors, etc., 10 to....	25 cts.
145. Empty boxes, rubbish and barrels in rear yard or alleys or in the recess for windows below grade, or in area or cellar openings under sidewalk gratings.............	10 cts.
146. Lights in show windows, open or unprotected, or if electric bulbs be covered with tissue paper or paper shades..	25 cts.
147. Sawdust spittoons, or sawdust on floors, especially in drug and oil stores...........................	25 cts.
148. If kerosene is used on floors when sweeping......	25 cts.
149. ASH AND WASTE CANS to be of metal. If not, charge...	10 cts.
150. HOT AIR FURNACES—The top of a brick furnace should be not less than four inches below wooden beams or plastered ceilings above, with a hanging shield. If portable furnace not less than twelve inches, with shield; charge for deficiency from 10 cents to..................	25 cts.
BOILER—Unsafely arranged, charge not less than.	25 cts.
151. FIREPLACES—Wooden floors should be trimmed at least sixteen inches from the front of chimney breast or fireplace, with a hearth of stone, brick or tile, supported by trimmer arch, which should be at least sixteen inches in width, measuring from the face of the chimney breast. If not so trimmed, or if hearth rests on wooden beams, or if wooden fireboards or summer pieces are used, or if wooden mantels are not protected with brickwork, or if stovepipe holes are not provided with metal stoppers, charge from 5 cents to.......	25 cts.
152. STEAM PIPES—In contact with woodwork, charge not less than......................................	1 ct.
153. ROOF SPACES, BLIND ATTICS, COCK LOFTS, ETC.—If elevator shaft, ventilating or other shafts communicate with roof space, connecting it by air drafts with the building, add not less than................	25 cts.
154. ELECTRIC LIGHTING or other system with installation not in compliance with Underwriters' Rules; or arc lights unprotected by tight globes or screens	25 cts.
154a. Crowded merchandise without proper aisles opposite or too near windows, overloading, not less than....	25 cts.

These charges, it is unnecessary to explain, are intended to be corrective. The faults would probably be removed with the incentive of a high rate charge, and their correction would tend to reduce the fire losses of the city. They are added as the last item of the schedule, after all deductions for fire appliances, etc., have been made, so that their correction would not necessitate a second computation of the rate, it being only necessary to deduct the gross charge from the final rate in case the risk is improved.

DEDUCTIONS FOR EXCEPTIONAL FEATURES OF FIRE APPLIANCES, CONSTRUCTION, ETC.

The following deductions are separated so as to apply, some of them to buildings and some of them to stocks. Certain features of construction and extinction may be of advantage to the one and of none whatever to the other.

The deduction for self-releasing floor-beams, arranged to prevent their tearing out the walls in case they should burn through and fall, No. 178, for example, has not been credited to stocks, because at the point where such provision would insure salvage on the walls the stock would have been destroyed. In like manner, fire patrols or salvage corps for saving merchandise by tarpaulin covers, etc., are credited to stocks, being of little value to the building.

No system of schedule rating can be correct which first builds up the rate of a building, taking into account all features of extinction and construction, and then adds to the final building rate, so obtained, a fixed sum intended to measure the additional cost of insuring the stock. Even a charge for exposure to a building ought to be considered and treated separately from the stock. An exposure which would damage the building might not in any way endanger a stock contained in it.

If an ideal or perfect standard should be employed for rating each risk, necessitating charges for variations or deficiencies, unnecessary labor would be entailed for the large majority of risks to be rated. The treatment of exceptional features of construction by making deductions not only saves labor on the large majority of risks which are deficient, but also insures that *in case any feature is overlooked, the insurance company will not be the loser, as would be the case if recognition of the exceptional feature should be provided for by charges for its absence.* Omissions would be especially frequent in the case of such features as self-releasing floor beams, waterproof paper between floors, metallic lathing, etc., which are not always easily ascertained. If the property owner is entitled to them he is not likely to overlook them.

DEDUCTIONS FROM RATE OF BUILDINGS.

The following deductions for exceptional features may be made from the occupied rate of buildings, after the occupancy charge has been added, by the following percentages of such occupied or gross rate (No. 128):

155. HYDRANTS, ETC.—If building within 300 feet of one post or flush hydrant, supplied by 8-inch or larger water-pipe, deduct .... 5 %

(If 6-inch pipe one-half deduction.)

156. HYDRANTS, ETC.—If within 300 feet of two or more hydrants, supplied by 8-inch or larger water-pipe, deduct .... 10 %

(If 6-inch pipe one-half deduction.)

157. HYDRANTS, ETC.—If said water-pipe be fed at both ends by mains or sub-mains, deduct an additional... 5

(If 6-inch pipe one-half deduction.)

NOTE.—Hydrants form the connecting link with the fire department of the city, and on their proximity depend the availability and value of steamers, etc. For this reason, risks in the suburbs of a city which are unprovided with hydrant service ought not to receive the full credit of the fire department.

158. AUTOMATIC FIRE ALARM, for approved telegraph signal to a central station, or fire dept. station, with thermostats, deduct .... 5 %

158a. BURGLAR ALARM—If approved system to central station, deduct .... 2 %

158b. SPECIAL BUILDING CALL DIRECT TO FIRE DEPT., approved system, telegraphic call box each floor, etc .... 5 %

(One-half allowance if no watchman.)

159. CHEMICAL ENGINES ON WHEELS—If one or more chemical engines are available in case of fire, deduct .... 5 %

160. FIRE ESCAPES—If iron fire escapes are provided on the outside of building, with landings at each floor, deduct .... 3 %

NOTE.—These are of advantage and are relied upon by firemen for fighting a fire, enabling them to hold advantageous positions to the last moment.

161. CASKS OF WATER or filled water pails on each floor, deduct, if no public hydrants within 300 feet 10%, if hydrants within 300 feet .... 5 %

NOTE.—To receive above deduction there must be at least six filled pails for each 2,500 square feet of floor area. If one-half the number of pails be filled with sand, especially in Oil Stores, sand being better than water for oil fires, or where water would be likely to freeze, it would be an improvement. One cask may be considered the equivalent of three pails.

162. STAND-PIPES—INTERNAL, adequate number near stairways, supplied from tank, with hydrants and sufficient approved hose attached at each floor at landings, deduct .... 2 %

163. If stand-pipes without tank, but under pressure to ensure water on highest floor .... 1 %

164. STAND-PIPES—EXTERNAL, for use of fire department, with siamese connections, deduct..............	1 %
165. ACCESSIBILITY TO FIRE DEPARTMENT—If building is on a corner or extends through to rear street or wide alley, affording access to fire department for fire extinction or removal of goods, deduct for each side or rear so accessible (none for front)...........................	3 %
166. PROXIMITY TO FIRE ENGINE HOUSE, ETC.—If risk to be rated is within 300 feet of a fire dept. house, engine or hose house, which would insure prompt response of skilled men to any fire alarm, deduct..................	2 %
If next door or opposite side street........................	5 %
167. BASEMENT AND SUB-CELLAR SPRINKLERS—If perforated 2½-inch pipe be provided in basement and sub-cellar, with attachment at street grade for fire department, standard size of thread and coupling, and standard butt and with waste ways to sewer, deduct from total building rate...	2½ %
NOTE.—Aside from the fact that fires are most likely to start in basements and sub-cellars, where accumulated rubbish, etc., cause them, it is difficult for the firemen to reach them; a system of piping, therefore, which would enable them to make hose connections at the street level would be of great advantage.	
168. AUTOMATIC SPRINKLERS IN BASEMENT and sub-cellars. If approved installation (unless deduction has been made for sprinklers throughout building, in which case no allowance for this), deduct................	5 %
169. DWELLING OCCUPANCY—If the occupancy of the building above the grade floor is for a family dwelling exclusively, 20 % may be deducted from the rate of the building.....	20 %
(If one floor only so occupied deduct 10 %.)	
170. DWELLING OCCUPANCY—If upper floors occupied by two families....................	15 %
171. DWELLING OCCUPANCY—If occupied by more than two families..................................	10 %
172. DWELLING OCCUPANCY—If occupied as a tenement-house above the grade floor, with the grade floor hall door open night and day, deduct only...............	5 %
173. OFFICE OCCUPANCY—If building occupied throughout exclusively for offices or office and dwelling, deduct..	25 %
174. OFFICE OCCUPANCY—If building occupied above grade floor exclusively for offices, or offices and dwelling, deduct...	10 %
175. WATCHMAN—If watchman (on premises) but no watch-clock, deduct.....................................	5 %
176. WATCHMAN—If watchman (on premises) with watch-clock or electric detector, deduct	10 %
(N. B.—If automatics, No. 158, allow only one-half deduction for watchman.)	
177. ROOF HYDRANTS, protected from freezing, deduct...	2 %
178. SELF-RELEASING FLOOR BEAMS—If floor beams and girders are arranged so as to be self-releasing in case of fire by means of metallic anchor-boxes or other provisions, deduct..	1 %
(See note 41, p. 23.)	
179. AUXILIARY PRIVATE FIRE PLANT, Force pump, etc., available for day, night and holidays; standpipe, hose attached at each floor; competent engineer on hand at all times, deduct..................................	10 %
(This in addition to 163, 164 and 176.)	
186. ....TOTAL,	

EXCEPTIONAL CITY FIRE DEPARTMENTS.

(The following deductions to be made from net rate of building No. 129 after above deductions have been made.)

184. EXTRA STEAMERS—If exceeding five steam fire-engines can be supplied with water and assembled at a fire, deduct for each engine in excess of five (one-half of one per cent.) not exceeding total of 20%.................................. ½% of net rate.

(N. B.—If the horses of any steamer are used for any other work, or if at least four of the men a e not paid firemen, no deduction shall be allowed under this item.)

NOTE.—The immense advantage in the cumulative effect of a large number of steam fire-engines which can be assembled at a fire, to the number of fifty or more, in cities like New York, Chicago, Boston, etc., even though there be no more than two to each square mile of compact portion (see p. 11), is not overestimated in the above percentages.

185. WATER-TOWER—If one, deduct........2½ % " "

" " If two, deduct........5 % " "

NOTE.—To secure this, risk must be within reach of tower.

186. FIRE-BOATS—For risks near water-front, say within 500 feet or on pipe lines where protection of fire-boats can be secured, deduct................5 % " "

186a. GRAVITY PRESSURE—For every effective fire stream available at the building and supplied by a gravity pressure of not less than 40 lbs. at the base of the nozzle by a hydrant on an eight-inch or larger main, deduct 1 % of the rate of building No. 129, not exceeding 15 % in all. *If the main be six inches*, one-half the above deduction.

Only one-half the foregoing deductions (whichever applies) in case the supply main from the reservoir is not in duplicate.

These allowances in addition to the allowances for extra steamers. See note, page 50, for explanation of this allowance.

If precautions are not systematically taken by the city to prevent freezing of hydrants, only one-half the deductions either for Extra Steamers or Gravity Pressure or Hydrant Deductions should be allowed.

N. B.—To entitle a risk to these deductions certain important conditions must exist, and they are easy of ascertainment. First, there must be the actual pressure at the base of the nozzle at all hours of the day and night *with the maximum number of streams for which credit has been given in full play.* It may happen that a pressure of 40 lbs. at the nozzle may be drawn down so soon as other hydrant outlets are opened. This is important. The pressure recognized, therefore, should be the minimum pressure at the hour of the day when it is least—on Monday mornings for example. To deliver a stream of 40 lbs. pressure at the nozzle would require that the pressure at the hydrant should be 80 lbs. to the square inch, using not over 250 feet of hose. Where the distance from the hydrant to the building is greater, requiring a greater length of hose and therefore involving greater friction, the pressure at the hydrant would need to be greater than 80 lbs. The allowance also requires street mains of adequate capacity and strength.

DEDUCTIONS FROM STOCK RATE, No. 133.

The following deductions for exceptional features may be made from the rate on stocks obtained by the rule explained on pages 39 to 41. The percentage to be deducted is the percentage of the said total stock rate (No. 133):

190. HYDRANTS, ETC.—If building within 300 feet of one post or flush hydrant, supplied by 8-inch or larger water-pipe, deduct.. 4 %

(If 6-inch pipe one-half deduction.)

191. HYDRANTS, ETC.—If within 300 feet of two or more hydrants, supplied by 8-inch or larger water-pipe, deduct.. 6 %

(If 6-inch pipe one-half deduction.)

192. HYDRANTS, ETC.—If said water-pipe is fed at both ends by mains or sub-mains, deduct an additional ... 4 %

(If 6-inch pipe one-half deduction.)

NOTE.—The same percentage of deduction is not allowed as in the case of building, for two reasons: first, the water throwing of a fire department is not as beneficial to stocks as to buildings; and, second, the stock rate being the larger rate of the two, would, on the lower percentage of deduction, get the full measure of credit.

193. AUTOMATIC FIRE ALARM—For approved automatic fire alarm telegraph signal to a central station or a fire dept. station, with thermostats, deduct.......... 5 %

193a. BURGLAR ALARM—If approved system to central station, deduct .... 2 %

193b. SPECIAL BUILDING CALL DIRECT TO FIRE DEPT.. 5 %

This must not be allowed unless there is at least one call on every floor, and half allowance if no watchman.

194. CHEMICAL ENGINES ON WHEELS—If one or more chemical engines are available in case of fire, deduct.. 5 %

195. FIRE ESCAPES—If iron fire escapes are provided on the outside of building, with landings at each floor, deduct.. 2 %

NOTE.—These are of advantage and are relied upon by firemen for fighting a fire, enabling them to hold advantageous positions.

196. CASKS OF WATER or filled pails on each floor, deduct, if no public hydrants within 300 feet 10%, if hydrants within 300 feet.. .... 5 %

NOTE.—To receive above deduction there must be at least six filled pails for each 2,500 square feet of floor area. If one-half the number of pails be filled with sand, especially in Oil Stores, sand being better than water for oil fires, or where water would be likely to freeze, it would be an improvement. One cask may be considered the equivalent of three pails.

197. STAND-PIPES—INTERNAL, adequate number near stairways, supplied from tank, with hydrants and sufficient approved hose attached at each floor at landings, deduct.. 2 %

198. STAND-PIPES—EXTERNAL, for use of fire department, with siamese connections, deduct............. 1 %

199. ACCESSIBILITY TO FIRE DEPARTMENT—If building is on a corner or extends through to rear street or wide alley, affording access to fire department for fire extinction or removal of goods, deduct for each side or rear so accessible (no deduction for front)...................... 3 %

200. PROXIMITY TO FIRE ENGINE HOUSE, ETC.—If risk to be rated is within 300 feet of a fire engine house or hose house, which should insure prompt response of skilled men to any fire alarm, deduct.................. 2 %
If next door or opposite side street......................... 5 %

201. BASEMENT AND SUB-CELLAR SPRINKLERS—If perforated 2½ inch pipe be provided in basement and sub-cellar, with attachment at street grade for fire department with standard size of thread and coupling, and standard butt and with waterways to sewer, and merchandise be on skids, deduct.................................... 2 %

202. AUTOMATIC SPRINKLERS IN BASEMENT and sub-cellars. If approved installation, deduct.........	5 %
(Unless deduction has been made for sprinklers throughout building, in which case no allowance for this.)	
203. DWELLING OCCUPANCY—If the entire occupancy of the building above the ground floor is exclusively for a family dwelling, deduct	20 %
If one floor only so occupied, deduct..........	10 %
204. DWELLING OCCUPANCY—If upper floors occupied by two families......................................	15 %
205. DWELLING OCCUPANCY—If occupied by more than two families..	10 %
206. DWELLING OCCUPANCY—If occupied as a tenement-house above the grade floor, with the grade floor hall door open night and day, deduct only..............	5 %
207. OFFICE OCCUPANCY—If building above grade floor is occupied entirely for offices, deduct..............	5 %
208. OFFICE OCCUPANCY—If building above grade floor is occupied entirely for offices and dwelling, deduct..	15 %
209. WATCHMAN—If watchman on premises and no watch-clock, deduct....................................	5 %
210. WATCHMAN—If watchman on premises with watch-clock or electric detector, deduct.................	15 %
NOTE.—One-half deduction for watchman if automatic alarm No. 193.	
211. ROOF HYDRANTS, protected from freezing, deduct...	1 %
212. FIRE PATROL—For salvage corps or fire patrol, if supported by city, deduct.	3 %
If supported by the Insurance Companies, no deduction. (Having paid for it, they are entitled to it.)	
213. COVERS, TARPAULINS—If merchandise covered by tarpaulins or other water-proof covers each night, deduct....	5 %
(These covers may be made fire-resisting by fire-proofing processes.)	
214. TIN-COVERED CASES—If merchandise be kept in tin-covered wooden side-wall and other cases, deduct...	5 %

NOTE.—These cases may be economically made of ordinary white pine, covered with tin, in the same manner that tin-covered doors and shutters are made (see specifications on these points) and may be grained to resemble woods, or may be veneered with real woods—mahogany, cherry, or others,—without impairing their fire-resisting qualities. Especially should the top and back of the case be covered with tin, to shed water, the top being inclined to throw the water beyond the line of frontage. If tin-covered sliding doors to these cases would prevent display of stock, glass doors may be used, which would save such stocks as hats, millinery, silks, cutlery, etc., from water damage.

215. SKIDS—If mdse. on skids or platforms six inches high, deduct........................	2 %
216. GRADE FLOOR STOCKS—Deduct for a stock entirely on grade floor, in non-fire department town, 10%*; in fire department town.......	5 %

*This deduction may result, in the case of a building of poor construction, especially if an exposed risk in a non-fire department town, in a lower rate on stock than on building, but under such circumstances the discrimination would be proper.

If the stock extends over only one additional floor, viz., the second or basement, deduct 3%. If stock extends over grade floor, basement and second floor, no deduction or charge (see rule for stocks above grade floor, p. 58).

217. AUXILIARY PRIVATE FIRE PLANT, Force pump, etc., available for day, night and holidays; stand pipe, hose attached at each floor; competent engineer on hand at all times, deduct 5%.

(This in addition to 197, 198 and 210.)

TOTAL,

EXCEPTIONAL CITY FIRE DEPARTMENTS.

(These deductions to be made from net rate of stock No. 134, after above deductions have been made.)

NOTE.—There are two reasons for making a separate deduction for exceptional Fire Departments; one is note No. 184; and the other that it saves charges for deficiencies on the large majority of cities and towns unprovided with such exceptional appliances.

219. EXTRA STEAMERS—If exceeding five steam fire-engines can be supplied with water and assembled at a fire, deduct for each engine exceeding five, one-quarter of one per cent. (¼ of 1%) of final rate (134). ¼% of net rate.

N. B.—If the horses of any steamer are used for any other work, or if at least four of the men are not paid firemen, no deduction shall be allowed under this item.

220. WATER-TOWER—If one, deduct 2½% " "

" " If two, deduct 5% " "

NOTE.—To secure this, risk must be within reach of tower.

221. FIRE-BOATS—If risk near water front, say within 500 feet, or on pipe lines where protection of fire-boats can be secured, deduct .... 5% " "

221a. GRAVITY PRESSURE—For every effective fire stream available at the building and supplied by a gravity pressure of not less than 40 lbs. at the base of the nozzle by a hydrant on an eight-inch or larger main, deduct ½ of 1% of the rate of stock No. 134, not exceeding 7½% in all. *If the main be six inches*, one-half the above deduction.

Only *one-half* the foregoing deductions (which ever applies) in case *the supply main from the reservoir* is not in duplicate.

These allowances in addition to the allowances for extra steamers.

If precautions are not systematically taken by the city to prevent freezing of hydrants, only one-half the deductions either for Extra Steamers or Gravity Pressure, or Hydrant Deductions should be allowed.

N. B.—To entitle a risk to these deductions certain important conditions must exist, and they are easy of ascertainment. First, there must be the actual pressure at the base of the nozzle at all hours of the day and night *with the maximum number of streams for which credit has been given in full play.* It may happen that a pressure of 40 lbs. at the nozzle may be drawn down so soon as other hydrant outlets are opened. This is important. The pressure recognized, therefore, should be the minimum pressure at the hour of the day when it is least—on Monday mornings, for example. To deliver a stream of 40 lbs. pressure at the nozzle would require that the pressure at the hydrant should be 80 lbs. to the square inch, using not over 250 feet of hose. Where the distance from the hydrant to the building is greater, requiring a greater length of hose and therefore involving greater friction, the pressure at the hydrant would need to be greater than 80 lbs. The allowance also requires street mains of adequate capacity and strength.

NOTE.—The reason for this extra allowance for gravity pressure in addition to the recognition of gravity pressure in the key-rate will be apparent from a consideration of the fact that in a town whose average pressure on the water

mains is only sufficient to supply steamers for suction there may, notwithstanding, be risks on lower levels than the average where it is only necessary to attach a hose to the hydrant to throw an effective fire stream. In the city of New York, for example, where the average pressure in the daytime for nine-tenths of the area is not over 22 lbs. to the square inch, there are three localities where the pressure at the hydrant is over 90 lbs. to the square inch. There are numerous cities throughout the country having different grades and, therefore, different hydrant pressures, such as Kansas City, Albany, Brooklyn, etc. A warehouse located on the lower level, having the benefit of full pressure, is certainly, in that respect, better than a similar one less favorably located.

The fact will not be overlooked that steamers may be prevented from reaching a fire by severe snow storms or blizzards, such as that which occurred in New York in March, 1888, or by an epizootic among the horses, such as occurred at the time of the great Boston conflagration of 1872. Even with auxiliary steamers, therefore, an adequate gravity pressure is a decided advantage, especially as credit for it is given only to the specific risks benefited. It would seldom be found that a city would get the allowance for both extra steamers and gravity pressure. Steamers are seldom purchased or retained where a gravity pressure is adequate. If steamers should be maintained, however, in conjunction with gravity pressure, as in Boston, for example, where the introduction of a high pressure system is probable, justice would require recognition of so important a fact. Where no steamers are supplied, the above credit, in addition to hydrant deductions, Nos. 155, 190, etc., would recognize the advantage of gravity pressure over direct pressure, explained in the article on Water Works (which see) of uniform pipe strains and constant readiness.

AUTOMATIC SPRINKLERS—For approved WET PIPE SYSTEMS deduct on buildings as follows; and on stocks three-fourths of the amounts named.

For DRY PIPE SYSTEMS make only three-quarters of allowance given for wet pipe systems.

The allowances assume that 80% co-insurance is carried. Decrease the deductions ½% for each 1% of co-insurance less than 80% on building and stock.

Equipments to be in compliance with the standard of the underwriters having jurisdiction, relative to number and location of sprinklers, size of pipes, feed mains, valves, fittings, etc.

GRADE "A." If connected with at least two approved independent water supplies, one of which must be automatic, in addition to approved outside connection for City Fire Department, deduct .... 40 %

GRADE "B." If connected with at least two approved water supplies without connection for City Fire Department, deduct .... 35 %

GRADE "C." If connected with one approved water supply in addition to approved connection for City Fire Department, deduct......... 30 %

GRADE "D." If connected with one approved water supply without approved connection for City Fire Department, deduct.................... 25 %

NOTE—Deductions for fire extinguishing or detecting appliances, such as automatic sprinklers, automatic alarms, etc., should be by percentages of the rate, for they clearly become valuable in proportion to danger, especially in the direction of increased ignitibility, and combustibility, it being important that in the case of rapid or intense fires these appliances should act promptly. No one would claim, probably, that any allowance should be made for sprinklers in a dwelling house, whereas a material reduction would be warranted in a woodworker. The intermediate degrees of hazard would best be measured by a percentage which would adjust the allowance according to the rate, which indicates the hazard. Especially should the allowance increase in the case of rates based upon large areas, for example; for as the rate grows larger in proportion to area the advantage of detection and extinction should increase proportionately, as it would by a percentage. If a sprinkler is good for 10,000 square feet of area in a risk of 50,000 square feet, more should be allowed if the whole area is protected than if a portion should be.

OUTSIDE SPRINKLERS (Not Automatic) — For approved equipment as per standard requirements adopted by the National Fire Protection Association or the underwriters having jurisdiction, deduct 50% of what the exposure charge would otherwise be.

N. B.—Reference may be had for information as to the proper installation of sprinklers to the National Board requirements and also to those of the New York, Boston and other boards.

CO-INSURANCE.

Co-insurance being most valuable where risks are under the protection of Fire Departments which tend to insure partial instead of total losses, and least valuable under conditions which result in total losses, the following rule should be observed, viz.: *Deduct (with the percentage co-insurance clause in policy) for co-insurance on risks under the protection of Fire Departments—*

ON BUILDINGS—½ of 1% of rate for each per cent. of stipulated co-insurance in excess of 50%, *not exceeding* 15% *in all.*

ON STOCKS—¼ of 1% of rate for each per cent. of co-insurance in excess of 50%, *not exceeding* 7½% *in all.*

ON RISKS NOT UNDER PROTECTION OF FIRE DEPARTMENTS—Deduct ¼ of 1% of rate for each per cent. of co-insurance in excess of 50% on both buildings and stocks, *not exceeding* 7½% *in all.*

N. B.—To secure these deductions the percentage co-insurance clause must be endorsed on the policy.

EXAMPLE—In the case of a risk in a fire department town, carrying 80% insurance, or 30% in excess of 50%, deduct 15% of rate on building and 7½% (¼ of 30%) on stocks. On a risk carrying 80% insurance in a non-fire department town, deduct 7½% (¼ of 30%) on building and the same percentage on stock.

NOTE.—Deductions for co-insurance must not be made *until all other deductions have been made* and a final rate obtained. (See Nos. 132 and 135.)
For explanation of rule see page 108.

IF INSURANCE IS LESS THAN 50% OF VALUE add 1% of rate for each per cent. that insurance is less than 50% of value.

FOR EXAMPLE — If insurance is 40% add 10% of rate; if 30% add 20% of rate.

GOODS IN FIRE-PROOF SAFES—If in building of ordinary floor construction with specific amount in safes with co-insurance clause, deduct 33⅓% of final rate on non-combustible goods, jewelry, etc., and 20% on combustible goods, silks, etc. This in addition to final deduction for Co-insurance.

(If in fire-proof building, see 332, page 73.)

TERM POLICIES—No policy shall be written for more than one year on building, lease or rents of any risk, except on the basis of adding three-fourths of the annual rate for each year in excess of one.* For fractional parts of a year in excess of one year, a pro rata proportion of the annual rate shall be added. No term policy to be written on stocks or other contents.

RENT RATES—If building of standard size, 25 x 100, four stories high, charge one-half of building rate, provided form contains full co-insurance clause. Increase rate ten (10) per cent. for each additional 50,000 cubic feet of contents, which obtain by multiplying ground floor area by height.

(The larger the building the longer the time required to rebuild and the greater the loss of rents.)

If no co-insurance clause, rate should be same as that of building.

LOWEST MINIMUM RATE.

No building, no matter how constructed or no matter what be the deduction to which it is entitled (even though sprinkled, co-insurance, etc., etc.), shall be rated below 12 cents, nor shall its contents, merchandise stored therein in original packages, be rated at less than 25 cents. If merchandise not in original packages, net rate shall not be less than 30 cents.

CHARGES FOR OCCUPANCY,

MERCANTILE STOCKS AND OTHER CONTENTS OF BUILDING.

In the table of occupancies, page 143, the first column contains the amount which should be added to the unoccupied building rate, ascertained by preceding schedule,

* This would yield 2½ annuals for 3 years and 4 annuals for 5 years.

page 38 (item 127), to measure the increased risk of the building by reason of such occupancy, and to obtain the "occupied building rate" (item 128), which will then be subject to the deductions on page 45.

The figures in the second column represent the sum to be added to the building rate to ascertain the rate at which the insurance on the stock or other contents should be written, said sum being reduced if the building is not standard, or if the city in which it is located is not standard, according to deficiencies as hereinafter explained.

In fixing a rate for a stock of merchandise, three features must be taken into account; first, the susceptibility of the stock itself to damage by fire, water or smoke; second, its liability to ignite easily or to cause fires; third, its liability by reason of inherent qualities, when ignited to cause dangerous or intense fires, resulting in total destruction of building and contents. These last two features should increase the rate of the building itself, and are measured in the following table by the amount named in the first column. All three should be taken into account in rating the stock itself.

Such stocks as laces and embroidery, wall-paper, millinery, artificial flowers, cutlery, etc., illustrate the first-named feature, while wholesale drugs, oils, cabinetware, household furniture, etc., illustrate the second and third features combined. Indeed, wholesale drug stocks or stocks of cabinetware would illustrate all three, being not only particularly susceptible to damage but liable to cause fires and those of destructive character.

If two stocks in the same building differ as to these last two features, one adding a greater amount to the building than the other, the difference between the two should be added to the minor hazard in fixing its rate. In the case of artists' materials and wholesale drugs, for example, the hazards of wholesale drugs, so far as they affect the building, adding thereto 100 cents, include all of the hazards of artists' materials, which add to the building 10 cents; the difference between the two (90 cents) measures the net effect of wholesale drugs upon a stock of artists' materials when both are under the same roof.

RATES OF BUILDINGS AS COMPARED WITH STOCKS.

Every underwriter of experience will understand, without explanation, that in direct ratio as a building approaches standard construction and in direct ratio, also, as the city in which it is located approaches the standard city, as to waterworks, fire-extinguishing appliances, etc., will the difference between a building and the merchandise contained in it increase; in other words, the better the construction and fire department the better will be the building as a risk compared with the stock, and the poorer the construction and fire department the less should be the difference in rate between the building and the stock. The system or plan of making additions to the building to obtain the stock rate, therefore, should be sufficiently elastic to conform to this principle. Inasmuch as the preceding schedule, by its deficiency charges, is intended to measure these differences, both of fire-extinguishing appliances and construction, the following rule for rating stocks will be conceded to recognize the principle stated:

RULE FOR RATING STOCKS.

From the rate of the Building occupied, No. 128, deduct a sum equal to 25% of the charges for deficiencies* of the building from standard, as ascertained page 38 (item 127). The remainder will be *the Key-rate of the Building for rating all stocks contained in it.* To this should be added the second column figure of any stock to obtain its rate which is then subject to deductions No. 190, etc. *Under no circumstances, however, must the difference between the stock rate and the building rate be less than 20% of the second column figure for the stock to be rated, which shall be the minimum addition to any building for the stock rate.*†

For example, let us suppose that it is desired to obtain the rate for a stock of dry-goods in a building whose unoccupied rate (item 127) is 65 cents. Of that sum the deficiency charges are, of course (the standard being 25

* 25 cents being the rate of a standard building in a standard city, the excess of this sum will be the charge for deficiencies of the building to be rated.

† Only in the case of movable grade floor stocks in exposed and weak buildings in non-fire department towns, should a stock rate be lower than a brick building rate; see note 216, page 49.

cents), 40 cents; 25% of which, or 10 cents, should be deducted from the occupied building rate before adding the rate named in the second column of the table for dry-goods (50 cents), making 1.05 for the stock, which rate would be subject to such further deductions for any exceptional features of fire extinction, etc., as are heretofore provided for, page 47.

If, on the other hand, the unoccupied building rate should be 41 cents, 25% of the deficiencies (16 cents), or 4 cents, should be deducted from the occupied rate of the building (No. 128), before adding the 50-cent charge for stock, making 87 cents the rate on the stock, so that the building rate would be 41 cents, and the stock rate 87 cents. A building so nearly standard as to be rated under the schedule at 29 cents, would have deficiency charges of only 4 cents; 25% of which, or 1 cent being deducted, would leave 28 cents, to which 50 cents being added for the stock, would make 78 cents as the rate for the stock and 29 cents as the rate of the building, the stock being nearly three times the rate of the building, as should be the case in a building of such construction.

It will thus be seen that the stock rate and the building rate will approach each other exactly in proportion as the building becomes undesirable and high-rated, whereas the stock and building rate will diverge exactly in proportion as the building approaches the standard as to construction and fire appliances.

BUILDINGS OF TWO OR MORE TENANTS—In buildings having more than one tenant the *charges are not cumulative*, but the rate of the most hazardous stock should be the one added to the schedule rate of the building at No. 127.

For example, in a building containing toys, which increase the building rate 10 cents, hardware, which increases the building rate 10 cents, and cabinetware and furniture, which increase the rate 25 cents, the sum total of these three should not be added to the building, but the highest rated one of the three. Therefore, the unoccupied rate of a building (item 127) should have added to it only 25 cents if containing the three stocks named.

In rating a STOCK IN A BUILDING OF TWO OR MORE TENANTS, *the amount named in the first column for the most hazardous*

occupancy in the building is taken for the occupied building rate, and 10% of the first column charge of each manufacturing tenant (other than the highest rated one, which is charged for at No. 128) is added at No. 106a.

If any stock in a building is of a character to increase the rate of the building, it should certainly, by the same amount, increase the rate of any other stock in the building, and the amount named in the first column of the occupancy table, therefore, as the measure of increase on the building is included in the rate of the most hazardous stock. For instance, artists' materials add 10 cents to the rate of the building, while wholesale drugs add 100 cents, and the difference, 90 cents, should be added to the rate of a stock of artists' materials, to measure the increased hazard by reason of its being under the same roof with wholesale drugs.

GENERAL MERCHANDISE, MIXED STOCKS, DEPARTMENT STORES, ETC., should be rated according to the proportion of various kinds of stock. This, of course, can only be approximately estimated by the person applying the schedule. He can, however, by intelligent observation of the stock, estimate the various kinds of merchandise and the proportion which each bears to the whole value, and thus easily determine about what average rate should be obtained. For example, in a stock consisting of paper hangings, wall-paper, etc., for which the rate is 1%, and carpets, oilcloths, etc., for which the rate is 40 cents, the addition to the building to obtain the stock rate should not be 140, but should be graded according to the preponderance of either stock. If the total stock is $100,000 in value, of which $90,000 is carpets (No. 634, which at 40 cents would yield $360 premium) and $10,000 wall-paper (No. 1622, which at 1% would yield $100 premium), the total premium for the stock would be $460, which would be an average rate of 46 cents. The rate for the second column of the table, therefore, to be added to the building should be 46 cents, the average of the two. If, however, the proportion were reversed, and the wall-paper should be $90,000 in value (premium on which would be $900) and the carpets $10,000 (premium for which would be $40), the total premium would be $940, and the average rate 94

cents. The rate of the second column, therefore, to be added to the building rate should be 94 cents.

A simple method of arriving at the proper figure for the second column is to add such fraction of the rate therein named for each class of merchandise as its value bears to the total value.

For example, in the above case, if three-fourths of the stock were carpets and one-fourth wall-paper, the rate would be three-fourths of 40 cents (30 cents), and one-fourth of 100 cents (25 cents), or 55 cents in all.

STOCKS ABOVE AND BELOW THE GRADE FLOOR —In other than single occupancy buildings, where the entire stock to be rated is above or below the grade floor, add 5 cents to the rate of stock for each floor above or below the grade.

If the stock to be insured extends over two or more floors, the charge should be an average for the floors covered, obtained by adding the charges for the different floors and dividing by the total number. For example, a stock covering the third, fourth, and fifth floors should be charged 10 plus 15 plus 20, total 45, divided by 3, equals 15 cents, which would be the average of the three charges. If stock extends over the three floors, grade, basement and second floor, no charge or deduction should be made.

FOR GRADE FLOOR STOCKS, SEE No. 216, P. 49.

RATING SLIP.—NON-FIRE-PROOF BUILDINGS.

Inspected by ______________________

*Survey No.*__________

Date ______________________190__

EDITION JANUARY, 1902.

UNIVERSAL MERCANTILE SCHEDULE.

Risk______________________ ***No.*** ______________________***Street,***

Stock of______________________ ***in*** ____***Story***____ ______________________***Bldg.***

Ins. Map, page______***Block***______***City of*** ______________________

DEFICIENCIES N. B.—For full explanation refer by No. of item to the Schedule.	No	Charge.

KEY-RATE OF CITY (See page 13.)............

WALLS—INDEPENDENT (for Party see No. 40) 38 Charge for EACH 4 INCHES deficiency in average from standard (*if bldg. over 4 stories high, double the charge.*) 02

39 On buildings over 3 stories high if average thickness less than 12 inches, add (in addition to No. 38) not less than 08

If two independent walls adjoin, 4 inches may be deducted from average of these requirements. Charge for one wall only, the most deficient.

A STANDARD INDEPENDENT WALL should be 12 inches at the top story and increase 4 inches for each story to the bottom. This would require if 3 stories an average of 16 inches, if 4 stories 18 inches, 5 stories 20 inches, 6 stories 22 inches, 7 stories 24 inches.

40 PARTY WALL. Charge for EACH INCH deficiency in average from standard (*if bldg. over 4 stories high, double the charge*) 01

41 If party wall less than 12 inches thick in any portion, add (in addition to No. 40) not less than 10

A STANDARD PARTY WALL should be 16 inches at the top story, increasing 4 inches for each story below. Average required for 3 story bldg., 20 inches, 4 story 22 inches, 5 story 24 inches, 6 story 26 inches, 7 story 28 inches, etc.

42 WALLS NOT PARAPET, each exposed side 05

43 POOR BRICKS or poor quality mortar 20

44 IRON FRONTS, for each not backed up with bricks and mortar 05

45 " " for each backed up .02

46 " " for each adjoining in row, in addition to above 02

ROOF—47 Composition and gravel 01

48 Slate 02

49 Shingle 15

50 MANSARD with wooden frame, 4 story or lower bldg., one side. .15

Each additional side 05

51 " on building 5 stories or more in height, one side 20

Each additional side 10

ROOF SPACE, BLIND ATTIC, COCK-LOFT, ETC.—52 Take maximum height if slanting roof, and add for each vertical foot .03, not exceeding a total of .10

FLOORS—53 Double flooring less than 3 inches thick, or single 2 inch flooring add 03

54 Single flooring less than 2 inches .05

55 FLOOR BEAMS OR JOISTS less than 3x10 inches 03

CEILING OR SHEATHING—56 Wood or strawboard CEILING, one story 05

each additional story 03

57 Wood or strawboard SIDING, one story .05; each additional story.. .08

If side walls FURRED and plastered, half charge for wood sheathing

57a Cloth or paper ceiling or siding on wooden studs, each story 10

AREA (Ground floor) ft × ....ft. Total........... sq. ft.

58 2,500 sq. ft. to 5,000, charge for each 1,000 in excess of 2,500 sq. ft. 01

59 5,000 " " 10,000, 3 stories, " " " " 02

5,000 " " 10,000, over 3 stories, " " " " 03

60 10,000 " or more, 3 stories " " " " 025

61 10,000 " " " over 3 stories not over 6 " " " " 05

(Not exceeding a total of 200 cents.)

62 10,000 " and over 6 stories, double the area charge

(Not exceeding a total of 300 cents.)

If building is of standard fire resisting construction throughout, halve the area charge.

ONE STORY BUILDING, one-half the charge for 3 story.

TWO STORY BUILDING, two-thirds the charge for three story.

If CURTAIN, BOSS OR DIVISION WALLS subdividing and *Strengthening* the building, even though with arched openings, deduct 10% of area charge for each wall so dividing the risk, not exceeding a total deduction of 40% of the area charge. Communications with adjoining buildings unprotected, charge for area both buildings and rate as one (allowing for lines on walls). If fire doors on communications are not standard, rate as if standard and make an additional charge under "Exposures" for defective doors.

SINGLE OCCUPANCY.—If only one tenant (outside of dwelling and office tenants) twenty per cent. (20%) of the area charge may be deducted.

HEIGHT—(Stories) 63 For fifth story, add 05

64 Sixth story 10

65 Seventh story 25

66 For each story over seven, add 40

These charges cumulative; for example, a seven story building would have 40 cts added. If any story double height, charge for two.

STANDARD BUILDING may be seven stories without charge if in town whose key rate is not over 30 cts.

66a Eighth story on standard building 24

66b Ninth story on standard building 40

ELEVATORS—67 Enclosed in lath and plaster shaft or hallway, or if provided with approved automatic trap doors 05

67a Fire proof shaft, but defective doors, or walls not through roof 08

68 Open .12

69 Wooden shaft without approved automatic traps .15

70 One half above charges for elevators in buildings otherwise standard, or in office buildings.

If more than one elevator, charge for worst and add one fourth charge for each additional.

STAIRWAYS—71 Enclosed in lath and plaster hallway or provided with automatic trap-doors in floors 07

71a Similar to above with traps closed only at night 12

71b Fire proof enclosure but defective doors, etc 05

72 Enclosed in wood with self closing doors each floor 10

73 Open 15

If more than one stairway, charge for worst and add one fourth charge for each additional. One half charge for 71, 72 or 73 if charge for 67, 68 or 69, but not the smaller charge.

If elevator and stairway are contained in the same shaft or opening, only one charge for the two.

No charge for stairways in buildings occupied exclusively for offices and dwellings above first story when stairways does not open into store.

WELL-HOLES—74 If open, and for each floor pierced (half charge for approved traps) 05

CHUTES, DUMB-WAITERS, VENT. SHAFTS (unless fire proof shaft), and small floor openings 75 Add for each, and for each floor pierced 02

SKYLIGHTS—76 If of thin glass (less than ¼ inch), or if unprotected wooden frames, charge for each 9 sq. ft. in excess of 9 (not exceeding a total of 25 cts) 02

If skylight is monitor style, charge for square feet in sides as well as top. If protected above and below with wire netting, or if wire glass, one half charge.

Same charges for floor lights less than ¾ inch thick.

WOODEN CORNICES, CUPOLAS, ETC.—79 Not less than 03

WOODEN AWNINGS—80 On one story buildings 10

81 One story buildings in non fire department towns 10 to 20

82 On buildings over one story 01

83 On buildings over one story in non-fire department towns 05 to 10

LIGHTING—84 Electricity, approved, (if unsafe see No. 154) 02

86 Kerosene (no charge if charged for electricity) 02

Any other system of lighting must be subject to approval of Local Board of Underwriters and charged for by rule.

HEATING—87 If by hot air furnace.. 03

88 Furnace, with metallic cold air box and all vertical hot air pipes through brick walls and one register fastened open, add (instead of No. 87) 02

89 Stoves ... 02

90 If stove pipes through floors or hollow partitions, protected, each 02

not exceeding a total of 10

For faults of stove pipes Nos. 91, 92, 93, 94 and 95 easily corrected, charge at No. 140.

96 Natural gas or oil fuel, approved pressure regulating appliances 05

CHIMNEYS—97 Not built from ground but on brackets, charge for each 05

98 If inadequate for service required, or walls of flues less than 8 inches thick, unless lined with pipe, not less than 05

99 If resting on attic floor beams or roof joists, add... 25

(in addition to No. 97)

100 Poor bricks or mortar (in addition to No. 43).... 20

101 Terra cotta or cement 50

STREET—102 If street on which building fronts is inaccessible, unpaved, etc not less than (No charge if no fire dept. and no charge for side or rear streets) 10

103 If less than 60 feet wide but over 50 02

104 If under 50 feet, add for each 5 feet less 02

WIRES—105 Overhead to interfere with fire dept. (telegraph, trolley, etc.) not less than 02

TENANTS—106 Each in excess of one, exclusive of office and dwelling tenants 02

106a For each MANUFACTURING TENANT in excess of the highest rated one (which is charged for in No. 128), add 10% of its first column charge in occupancy table.

106b If MANUFACTURING RISK add ½ of .01 for each operative employed in excess of 10 (not exceeding a total of .25) in risks where the first column charge does not exceed .25. In woodworking or other hazards where first column charge exceeds .25, double the charge, but total not to exceed 1.00.

AGE of building—107 Over 20 years (if in poor repair charge at No. 144) 02

FRAME REARS—108 Extensions, etc., not less than..................... .10

If protected with approved metal covering half charge.

STONE PIERS—109 Stone columns, pillars or brick piers with bond stones, carrying important weights, charge according to number not less than 05

IRON COLUMNS UNPROTECTED—110 Cast iron 10, steel or wrought 15

STEAM BOILER—111 (other than heating) Charge if in basement .05, above basement .10, wood shavings for fuel 1.00 additional

If boiler in fire proof room cut off in approved manner, no charge.

POWER—112 Charge according to hazard ....

TOTAL DEFICIENCIES PLUS KEY RATE

DEDUCT FOR EXCEPTIONAL CONSTRUCTION.	No	$

117 No cellar or basement, deduct 10%

118 SMALL RISKS under 1500 sq. ft. ground floor area and not over 3 stories high 10%

119 Tin or sheet iron between floors 5%

120 Water proof paper or cement between floors 2%

121 Floors water proof and also inclined with scuppers to carry off surplus water to sewer 5%

121a If floors exceed 3 inches in thickness, deduct 1% for each excess inch (in addition to 119, 120 and 121)

122 If grade floor fire proof 10%

123 Each fire proof floor above grade (not exceeding a total of 40%) 5%

124 Metallic studs and lathing throughout 10%

125 Metallic lathing on wooden studs 5%

126 PARAPET WALLS exceeding one foot above roof on all exposed sides, deduct for each foot in excess of one (not exceeding a total of 3%). 1%

TOTAL. .. $

127 **RATE OF BUILDING UNOCCUPIED.** FORWARD (OVER)... ....

127 **RATE OF BUILDING UNOCCUPIED** Brought Forward, ...
Occupied by Nos . . . as per table page 143
Add for occupancy (amount in first column of table page 143 . . .
[illegible]

128 **RESULT RATE OF BUILDING OCCUPIED** . . .

DEDUCTIONS FOR FIRE APPLIANCES, ETC. ON BUILDINGS. — No. — Per Ct.

155 One hydrant supplied by 8 inch water main, within 300 feet 5%
156 Two or more hydrants 8 inch main within 300 feet 10%
157 If said water pipe be fed at both ends by mains 5%, (15% in all)
[illegible]
158 Automatic fire alarm [illegible] fire dept 5%
158a Burglar alarm approved system to central station 2%
158b Special [illegible] fire dept [illegible] 5%
159 Chemical engines on wheels available in case of fire 5%
160 Iron fire escapes outside of building with landings at each floor 2%
161 Casks of water or filled pails on each floor [illegible] to each 2,500 square feet of floor area [illegible], if no hydrants within 300 ft 10%
[illegible]
162 Standpipe internal with tank supply 2
163 " " without tank supply 1
164 " external with siamese connection for use of fire dept 1%
165 Each side or rear accessible to fire dept no deduction for front 3%
166 Fire department house engine, hose or hook and ladder within 200 feet 2%, if next door or on opposite side of street 5%
167 Basement and sub-cellar perforated pipe sprinklers 2%
168 Automatic sprinklers in basement, no deduction if allowance has been made for sprinklers throughout building 5
169 Occupancy exclusively dwelling above grade floor if one family 20%
(if only one floor so occupied deduct 1%)
170 " " if two families 15%
171 " " if more than two families 10%
172 " if tenement house above grade floor 5%
173 " if building occupied throughout exclusively for offices or dwelling and offices 2%
174 " if occupied exclusively above grade floor for offices or offices and dwelling 10%
175 Watchman but no watch clock 7%
176 with watch clock or electric detector, one half deduction for watchman if automatic alarm No 158 1%
177 Roof hydrants protected from freezing 2%
178 Floor beams and girders self releasing 1%
179 Auxiliary private fire plant force pump, etc 10%
Total Deductions . . . . %

EXCEPTIONAL CITY FIRE DEPARTMENT—184 Extra steamers [illegible] for each one in excess of five (not exceeding a total of 20%) **185** Water towers if one 2½%, if two 5% **186** Fire boat available 5% **186a** Gravity Pressure, for each effective fire stream available at risk supplied by a gravity pressure of not less than 40 lbs at base of nozzle by hydrant on 8 inch or larger main deduct 1% (not exceeding a total of 7½%) If 6 inch main one half deduction
[illegible] 186) in case supply main from reservoir is not in duplicate or unless precautions are taken by the city to prevent freezing of hydrants. See page 17
Total %

129 **RESULT** Net rate of building occupied unexposed
130 **EXPOSURE** If any add according to hazard
130a **CONFLAGRATION HAZARD** due to congested business district
131 **RESULT** Net Rate of Building Occupied and Exposed

131a **AUTOMATIC SPRINKLERS**—See rule page 51
DEDUCT FOR % **CO-INSURANCE** See rule page 52 .
On buildings in fire department towns (5% for 80%) .
On buildings in non fire department towns (7½% for 80%) .
132 **RESULT** Net Rate of Building Occupied with % Co Insurance
ADD FOR ADVERSE LEGISLATION, Valued Pol Laws Taxation etc, No 136, page 42

ADD FOR FAULTS OF MANAGEMENT, EASILY CORRECTED. — No — Charge

140 If stovepipes through floors or partition, not protected 50 through window roof or wall with double metal chimney 50 not protected 100, entering bottom of flue vertically 25, entering flue in attic or unused room, etc 25
140a Floor beneath stove not protected 05
141 Bottom of elevator shaft used for closets etc, or waste 50
142 Swinging gas brackets or bracket lamps unprotected, for one 05
each additional one 01
143 Untidiness rubbish ashes, etc especially in cellar 25
packing material not in bins 15
144 Cracked or bulged walls thin and worn floors, broken plastering broken windows etc . . . . . . 10 to 25
145 Empty boxes, rubbish, etc, in rear yard, alleys, window recesses, under sidewalk gratings, etc 10
146 Open lights in show windows or electric bulbs covered with tissue paper or paper shades . . 25
147 Sawdust on floors sawdust spittoons, etc 25
148 Kerosene used to sprinkle floors 25
149 Ash and waste cans, not metal 10
150 Furnace top within 4 inches of wooden beams or ceiling, if brick or within 12 inches if portable with metallic shell 10 to 25
151 Fire places, hearths on wooden beams or floors within 16 inches of fire place or wooden fire boards or summer pieces, or unprotected wooden mantels or open stove pipe holes 05 to 25
152 Steam pipes in contact with wood, not less than 01
153 Elevator or other shafts communicating with roof space 25
154 Electric lighting or other system, with installation not in compliance with underwriters' rules or arc lights unprotected by tight globes or metal screens . . 25
154a Crowded merchandise without proper aisles, opposite or too near windows overloading not less than 25

FINAL RATE ON BUILDING—Including Co ins charges for faults of management, etc)

TO OBTAIN RATE ON STOCK.

RATE OF BUILDING OCCUPIED No. 128, above . . . . .
Deduct a sum equal to one fourth of the deficiencies of the building .
[illegible] one fourth of excess of Rate No 127 over 25 cents as follows Rate No 127 cents less 25 cents, equals [illegible] one fourth of which [illegible] (deducted from 128) leaves
Extend difference into further column
N. B. This will be the **KEY OR BASIS RATE FOR ALL STOCKS IN THE BUILDING.**
Add amount named in second column of occupancy table for "susceptibility" of the stock to be rated .
Add (in other than single occupancy buildings) 5 cts for each floor on which the stock to be rated is above or below grade . . .
If [illegible] over two or more floors add the charges for all and divide by the total number of floors covered [illegible]. For example, for third floor 10 cts, for [illegible] fifth 20 cts [illegible] divided by 3 equals 15 cts. If stock extends only over the [illegible] floors grade, basement and second floor [illegible] See [illegible]
GRADE FLOOR STOCKS If stock exclusively on grade floor in non fire dept towns, deduct 10%, in fire dept towns deduct 5%, if stock extends only over *one* additional floor, basement or second deduct 5% . . . .
PUBLIC WAREHOUSES and Storage Stores **BONDED**, deduct 33⅓% .
PUBLIC WAREHOUSES and Storage Stores **FREE**, deduct 25%
PRIVATE WAREHOUSES Original unbroken packages only 20% Sales by sample only, 15% Delivery of broken packages 10% . . . .

133 Total .

DEDUCTIONS FOR FIRE APPLIANCES, ETC. ON STOCKS. — No — Per Ct

190 If one hydrant supplied by 8 inch water main within 300 ft 4%
191 Two or more supplied by 8 inch water main within 300 ft 6%
192 Water pipe fed at both ends by main additional 4% (10% in all)
(If [illegible] Nos 190, 191, 192)
193 Automatic fire alarm to fire dept or central station 5%
193a Burglar alarm, approved system to central station 2%
193b Special building call direct to fire department, (one half allowance if no watchman) 5%
194 Chemical engines on wheels, if one or more 5%
195 Iron fire escapes outside of building with landing at each floor 2%
196 Casks of water or filled pails (at least 6 filled pails to each 2,500 square feet of floor area, 5% if no hydrants within 300 ft, 10%)
197 Standpipe internal with tank supply 2%
198 external, siamese connection for the use of fire dept 1%
199 Each side or rear accessible to fire dept no deduction for front) 3%
200 Fire dept house engine hose or hook and ladder within 300 feet, 2%, if next door or on opposite side of street 5%
201 Basement and sub-cellar perforated pipe sprinklers and stock be on skids 2%
202 Automatic sprinklers in basement no deduction if allowance has been made for sprinklers throughout building 5%
203 Occupancy, exclusively dwelling above first floor, if one family . 20%
(If only one floor so occupied deduct 10%)
204 " " " if two families . 15%
205 " " " if more than two families 10%
206 " if tenement house above grade floor . 5%
207 " If building occupied above grade floor entirely for offices, 5%
208 " if for office and dwelling 15%
209 Watchman but no watch clock . . . 5%
210 " with watch clock or electric detector, (if automatics No 193, allow only ½ deduction for watchman) . 15%
211 Roof hydrants protected from freezing 1%
212 Fire patrol supported by city, (if by insurance companies nothing) 3%
213 If merchandise covered by tarpaulins each night 5%
214 Merchandise in tin covered cases . 5%
215 If merchandise on skids or platforms 2%
217 Auxiliary private fire plant, force pump, etc. . . . 5%
Total . . . . . %

EXCEPTIONAL CITY FIRE DEPARTMENT—219 Extra Steamers, ½ of 1% for each in excess of five (not exceeding 15% in all) **220** Water tower if one, 2½%, if two 5% **221** Fire boat available, 5% **221a** Gravity Pressure for each effective fire stream available at risk supplied by a gravity pressure of not less than 40 lbs at base of nozzle, by hydrant on 8 inch or larger main, deduct ½ of 1% (not exceeding a total of 7½%). If 6 inch main one half deduction
These [illegible] but only one-half the foregoing deductions except No 221 in case supply main from reservoir is not in duplicate or unless precautions are taken by city to prevent freezing of hydrants. See page 50
Total . . . . %

184 **RESULT** —Net rate on stock in unexposed building . . . .
N B Minimum Stock Rate—The stock rate at this point, No 134 must exceed that of Building at No 128 [illegible] equal to 5% of the second column charge in the table for the stock, if it [illegible]
134a **EXPOSURE** If any add according to hazard . . . .
134b **CONFLAGRATION HAZARD** due to congested district . . . .

134c **AUTOMATIC SPRINKLERS** —See rule page 51 . . . .

DEDUCT FOR........% **CO-INSURANCE** (7½% for 80%) . . . .
135 **RESULT** Net Rate on Stock With % Co Insurance . . . .
ADD FOR ADVERSE LEGISLATION, Taxation Valued Pol Laws, 136, page 42 . . . .
" " **FAULTS OF MANAGEMENT**, if any, 140 to 154 above . . . .

FINAL RATE ON STOCK— Including Co ins, charges for faults of management, etc.)..........

APPLICATION OF SCHEDULE.

The following example will illustrate the application of the schedule :

Let us assume that a building is to be rated in a given city and that, starting with the charge for basis rate of a standard building in a standard city, of .... 25 cts.

the following additions thereto are to be made for variations of the city from standard :

Waterworks, direct pressure system, pumps by steam-power, in duplicate (No. 5)	4 cts.		
Absence of standpipe or intermediate reservoir, affording a supply in case pumping machinery should not work ....(No. 7)	2 cts.		
No Fire Marshal..............(No. 22)	2 "		
No building law...............(No. 25)	3 "		
Electric trolley railroad.........(No. 26)	2 "		
Natural gas for fuel...........(No. 28)	2 "		
	——	15 cts.	
Total..................		40 cts.	
From this, if auxiliary steamers are provided, a deduction would be legitimate of 5%............		2 "	
Leaving the KEY-RATE OF THE CITY in which risk is located....................................		38 cts.	

Let us assume that to this key-rate should be added for deficiencies of the building to be rated from standard construction, as follows :

Walls, not according to standard (No. 38)	2 cts.	
Slate roof.................... (No. 48)	2 "	
Floors, ordinary...............(No. 54)	5 "	
Area.......................... (No. 59)	3 "	
Stairways.......... ....(No. 72)	10 "	
Lighting by kerosene..........(No. 86)	2 "	
Heating, by furnace............(No. 87)	3 "	
	——	27 cts.

Result, RATE OF BUILDING UNOCCUPIED....65 cts.

(Subject to deductions for any exceptional features, page 45.)

If at this point, for example, we desire to obtain the rate on a stock of retail dry goods, for which the charge in the second column of the table is 50 cents, we deduct from the above rate of 65 cents for building unoccupied, 25% of the deficiency charges contained in such unoccupied building rate of 65 cents (65 minus 25 equals 40) or 10 cents leaving 55 cents as the key or basis rate of the building for rating all stocks contained in it, and to this key-rate we add the 50 cents for dry goods (No. 811 in table), making 1.05 as the rate on the stock. If the risk be entitled to no other deductions contained in the list, page 47, it may safely be assumed that under the encouragement of the deduction No. 196 of 10%, casks and pails will be introduced, and the stock rate, therefore, will be 10 cents less, or 95 cents.

If, instead of being in a single occupancy building, a stock of wholesale drugs with compounding is also in the building, the rate of the building and dry goods will be increased 100 cents, which would make the rate of the building 1.65 or, deducting 10% for casks and pails, 1.49 net. The rate on the dry goods would be computed as follows:

To the building rate, as above..................	65 cts.
Add for the amount which wholesale drugs increase the building and all other stocks therein......	100 "
Result, occupied building rate (No. 128)...	165 cts.
From which deduct 25% of the deficiencies	10 "
Result, key-rate of building for rating stocks	155 cts.

To which 50 cents would be added for dry goods rate, making 205, and 85 cents (No. 806) for wholesale drugs, making 240 cents the rate for the latter stock.

From which deducting for casks and pails 10% in each case, would give a net rate for dry goods of 185, and for wholesale drugs of 216.

Stated by way of formula:

$$65+100=165 \text{ Building rate.}$$
$$165-(40\div4)=155+85=240=\text{Drug rate.}$$
$$165-(40\div4)=155+50=205=\text{Dry goods rate.}$$

It will be observed that the difference between the rates for the two stocks is exactly that of the difference between

their second column figures in the table of occupancies, *i e*, 35 cents, which measures their difference as to susceptibility to damage. They differ also as to "ignitibility," and "combustibility," but being under one roof the Dry Goods have been brought to this feature of Wholesale Drugs by the addition of 100 cents (the first column figure for wholesale drugs, the highest rated stock) in fixing the key-rate of the building for all stocks in it.

Nearly one-half of the labor in the computation, it will be observed, is that of ascertaining the key or basis rate of the city, which, however, once obtained in this manner does not have to be again computed. Every risk in the town can be rated by simply starting with 38 cents basis or key-rate obtained as stated. Before half a dozen risks have been rated, the deductions which are provided for will be understood without checking off the list for each risk; and the compilers believe that those who regard the application of the schedule as an arduous task will be convinced that it is not.

FIRE-PROOF SCHEDULE.

This schedule is arranged for rating a fireproof building so that the initial rate will be that necessary to cover the wooden trim, plate glass, decoration, floor boards and other combustible materials—the rate at this point (No. 320) approaching that for a non-fireproof building. It will receive a lower rate thereafter only in proportion as the insurance approaches the value, as will be seen by the table, and in proportion as the insurance actually covers the fireproof portion.

A building, for example, which would rate 86 cents with 20% of insurance would rate 34.4 cents with 80% co-insurance. A fire-proof building which would rate 116½ with 15% insurance would rate 40 cents with 80% co-insurance. With 15% insurance the company would be liable practically for the destructible portions of the building; with 80% of insurance it would be covering also bricks and mortar, iron beams, etc.

The committee believe that the comparative rates on fireproof buildings and the stocks contained in them will commend themselves to underwriters as being relatively correct. Merchandise on a single floor of a fire-proof building once on fire would probably be as thoroughly destroyed as in a non-fire-proof building. It would have the advantage of being cut off horizontally as well as laterally from other floors and other buildings, but unless the floors are cut off at each story little is gained and the schedule does not make material reductions in rates. Where the floors are cut off at each story, and the policy covers merchandise on various floors, the deduction is made at the point for co-insurance—obviously the correct place for recognizing this feature of the risk, for without co-insurance the advantage would pass to the owner.

It will be observed that the deduction for 80% co-insurance on one floor is 15%, as compared with 30% deduction where the policy covers four or more floors.

Stone Treads to Staircases.—These have been charged

for, as they are found to be serious faults, the stone treads yielding early in the fire to fire and water. Where they are let into rabbets in an iron frame the result is an iron staircase of holes which would be impassable for the exit of inmates or the ascent of firemen. The new building law of New York requires that the stone treads shall in all cases be supplemented with iron treads beneath the stone.

UNPROTECTED IRON COLUMNS, ETC.—The schedule recognizes a difference between cast iron, steel and wrought iron in accordance with the views of iron factors and other experts. In a large convention of iron factors held some time since in this city, there was not a dissenting voice as to the superiority of cast-iron in the matter of rust over wrought-iron, and possibly over steel. All agreed that cast-iron would not rust to the point of danger, but that wrought-iron would rust to the point of destruction, while steel had not been tested a sufficient length of time to tell whether or not it would be susceptible to the danger of rust. This is an important matter where iron is required to be covered with incombustible material, preventing its examination from time to time. The fire in the Appleton Building some years ago, and in the Cammeyer Building more recently, not to mention other tests, prove the superiority of cast-iron pillars over wrought-iron for resisting fire.

SCHEDULE FOR "FIRE-PROOF" BUILDINGS.

STANDARD BUILDING.—Walls not less than 16 inches for the upper 25 feet portion, thence increasing 4 inches for each 25 feet to the bottom; not exceeding five thousand square feet of ground floor area; height not over eight stories; floor beams and girders to be supported by masonry. (If "skeleton" construction, floors carried entirely by iron framework, see No. 286.) Not to be occupied above seventh floor for storage of merchandise or other combustible material whose burning would injure the ironwork, see Deficiencies, No. 297a. All iron beams, girders and pillars or story posts to be protected by approved fire-resisting material, except in office and hotel buildings, in which half charge for absence of covering. If wrought iron or steel is used in construction, that portion of the masonry in contact with the metal should be free from cement or plaster of Paris, and only lime mortar should be used. At least one stairway to be fire-proof with metal treads; stone treads, whether marble or slate, being dangerous.

Note—Cast-iron will not rust to a dangerous point, but wrought iron, and possibly steel, especially where constructed on the "Z" iron method, with riveted joints, are especially liable to rust in the joints. Cement and plaster of Paris are absorbents of moisture from the atmosphere, and should never be in contact with iron or wood. Lime mortar is not injurious.

285. KEY-RATE OF THE CITY, as ascertained by Schedule, see page 13................................

286. WALLS.—If "skeleton" construction, *i. e.*, thinner walls and floors carried by riveted wrought iron or steel posts or columns, charge.............................. 5 cts.

NOTE.—No charge if the upright or vertical supports, pillars or story posts be of cast-iron. The beam-bearing brackets should be cast in one piece with the pillar, and not secured by rivets, which are liable to rust, especially if of wrought iron or steel.

Skeleton construction, while not so durable for weight-carrying purposes, and from a structural view point (on account of the liability of vertical members, posts, pillars, etc., to rust when enclosed), as the old-fashioned construction in which all of the weights are carried by the brick or stone walls, is yet only little inferior for fire-resisting purposes, where the iron members are protected with incombustible materials.

287. WALLS.—If the average thickness of the two side or bearing walls (or either of them) be less than 20 inches (obtained by adding the thickness of the various stories and dividing by the number) charge for EACH INCH of deficiency .... 2 cts.

If any portion of the wall be less than 12 inches, double the charge. The growing practice of lessening the thickness of the walls of fire-proof buildings in "skeleton" construction is calculated to lose, in the way of vertical fire-stops, all that is gained in the horizontal fire-stops of separating fire-proof floors, so that while a building may be protected from a fire spreading throughout its own floors it will not be safe from fire in an adjoining building.

288. STONE FRONTS OR SIDE WALLS.—If of stone or of stone ashlar, plain or "axed" finish, add 1 cent for each; if carved or ornamental, add .... 2 cts.

This charge may seem small, in view of the perishable character of stone and the serious damage by the joint action of fire and water to carved surfaces, but when is taken into account that the extra charge is distributed over the entire amount of insurance on the building, and that the Company receives it on the bricks and mortar, and iron work, as well as on the carved side and front, it will be seen that the charge is sufficient, and can reasonably be a small fraction of what would be necessary for the stone side or front itself, if its value were the only subject of insurance.

289. WALLS.—If the brick are not hard burned and of good quality, or if the mortar be of poor quality for want of sharp sand, etc., an additional charge should be made of not less than.. 20 cts.

290. UNPROTECTED IRON.—If columns and lower flanges of iron beams unprotected, charge as follows: for unprotected cast-iron columns,.10; unprotected wrought-iron or steel columns, .15; unprotected lower flanges of beams, .02.

NOTE.—Half charge for this in hotel or office buildings in which there is not enough combustible material to destroy the iron work.

Office buildings include partial occupancy by sample stocks or small restaurants or grade floor stocks whose first column charge is less than 15 cts.

All experts in iron concede that wrought-iron is certain to rust to the point of destruction, and is also liable to yield to heat and fire, and that the durability and stability of steel has not yet been determined. Inasmuch as all iron members should be protected by incombustible material, which necessitates concealment of rust conditions, the preference has been given to cast-iron columns. In the case of the Cammeyer building fire in New York, in January, 1899, 6-inch cast-iron columns, as elsewhere stated (page 37), stood the fire better than brick piers with bond stones.

291. WOODEN CEILING.—If ceiling of wood or strawboard or other combustible material, add, according to hazard, not less than 1 cent for one story, and ½ cent for each additional story..............................

292. WOODEN SIDING. — If side-walls ceiled with wood or other combustible material from floor to ceiling (no charge for dados), charge for one story 1 cent and ½ cent for each additional story.......................

293. AREA.—If ground floor area exceeds 5,000 square feet, up to 10,000 charge for each 1,000 or fraction thereof in excess of 5,000................................¼ of 1 ct.

(If building occupied above grade floor exclusively for offices or dwellings, no charge for area.)

294. AREA.—If ground floor area exceeds 10,000 square feet, charge for each 1,000 or fraction thereof in excess of 10,000 (not exceeding a total of 40 cents).......... 4 cts.

If mercantile building exceeds 10 stories, double charge.

There is a point at which area in a fire-proof building may become an advantage, rather than an objection. It is for this reason that a limit of charge is made.

(If building occupied above grade floor exclusively for offices or dwellings, no charge for area.)

295. HEIGHT.—For each story in excess of eight, up to twelve, charge.................................... 1 ct.

296. HEIGHT.—For 12th and each story over 12 up to 15, charge.. 3 cts.

297. HEIGHT.—For 15th and each story over 15, charge .... 10 cts.

297a. IF MERCHANDISE BE STORED ABOVE 7TH FLOOR, charge 15 cents, and add 2 cents more for each floor over 7th up to 10th, and 5 cents more for 10th and each floor above 10th. For example: an eleven-story building would have 29 cents added.

It probably requires no explanation or argument to state that the storage of merchandise at a greater height above the street than seven stories, or 85 feet, where a fire department would experience difficulty in handling a fire, would be an added hazard, not merely to the merchandise so located, but to all other materials in the building, and to the structure itself.

298. FLOORS.—Wooden floor boards laid solid on concrete without air space, 10 cents; if with air space, 15 cents (office buildings one-half).

Standard construction would be incombustible asphalt or concrete floors, without any wooden floor boards whatever. A nailing strip can easily be inserted around the border for fastening carpets or other floor covering.

298a. FLOOR ARCHES.—If concrete, cement or approved plaster composition floor arches with iron centres or supports (such as Metropolitan, Roebling, Expanded Metal, Fawcett, Columbian, Bailey, Guastavino, Rapp *arch* construction, etc.) (no charge for segmental arches of brick, burnt clay or terra cotta)...................................... 10 cts.

If on exposed corrugated iron centres.................. 15 cts.

If flat arch supported on iron (such as Rapp's flat type).. 20 cts.

If space between iron floor beams exceeds 5 feet, for each foot in excess.............. .... 2 cts.

N. B. One-half these charges in office or hotel buildings.

The best floor arch is the old-fashioned brick segmental arch properly bonded; it will successfully resist the pas-

sage of flame and heat. Tile arches of well-burned clay rank second to brick, but are not equal to brick arches, because of the difficulty of properly laying them, which involves the danger of carelessness and indifference on the part of masons, and because of the danger of fractures. Some of the patent floor arches are good in their way, but none of them is equal to brick or tile.

299. ELEVATORS.—If not in shaft, according to the standard, but in hallway, or enclosed court, or if provided with approved automatic trap-doors in floors, charge...... 6 cts.

(Office or hotel buildings one-third charge.)

300. ELEVATORS. If open from floor to floor and varying from above, charge.......................... 12 cts.

(Office or hotel buildings one-third charge.)

301. ELEVATORS.—If shaft is sheathed or lined with wood (unless covered with tin or galvanized iron, or enclosed as above), charge (one-half charge for office building).. 15 cts.

If elevator and stairway are combined and contained in the same shaft or opening, make only one charge for the two. For each additional elevator not cut off add 2 cents.

302. STAIRWAYS.—If not enclosed according to the standard, but in separate hallway or shaft enclosed by lath and plaster partitions with self-closing spring doors at each floor, or automatic trap-doors in floors, charge (no charge in building occupied above grade floor exclusively for offices or dwellings)............................ 5 cts.

(If charge has been made for 299, 300 or 301 one-half charge.)

303. STAIRWAYS.—If the enclosure is of wooden partitions instead of lath and plaster, with self-closing doors at each floor, charge................................ 10 cts.

(If charge has been made for 299, 300 or 301 one-half charge.)

304. STAIRWAYS.—If open staircases from floor to floor throughout building, charge not less than 1 cent each floor not exceeding a total of........................ 12 cts.

If office building, not exceeding total of............. 4 cts.

(If charge has been made for 299, 300 or 301 one-half charge.)

For each additional stairway add one-fourth charge....

305. STAIRWAYS.—If at least one stairway is not fire-proof with metal treads (no charge for hard wood treads over iron), charge as many times .02 as the building has floors (one-third charge for office building). If stairway in fire-proof hall or enclosure protecting stone treads from heat one-half final charge.

A destructible staircase with stone treads may result in the destruction of a building otherwise fire-proof. Where

stone treads are used, they should rest upon an iron tread, which would keep the stone in place for a footing when cracked or pulverized by heat. Stone treads of marble or slate are often laid into the rabbets of the iron frame, and are supported simply around their edges. Such treads would easily yield to fire, and falling, would punch out the treads below, endangering firemen, and prove a delusion and snare to all who attempt to use them. They should be prohibited by law, and are now prohibited by the building law of New York, but in no other city. A building having one safe staircase escapes charge No. 305, but it is a question if a building so protected should not be charged something additional, if it has an unreliable stone staircase, even though it may have in addition a safe one.

306. WELL-HOLES, HATCHWAYS, ETC.—If not provided with self-closing traps, add, according to size, for each floor pierced, not less than.................... 3 cts.

(No charge for office building.)

307. WOODEN CHUTES, DUMB-WAITERS, VENTILATING SHAFTS, BELT HOLES and openings through floors for steam and water pipes, etc., tend to the rapid spread of fire and smoke throughout the entire building, and should be charged for according to size, not less in any case, for each floor pierced, than.............. 2 cts.

NOTE.—No charge need be made for openings for steam and water pipes if the space around the pipes is filled in with mineral wool, asbestos or other incombustible material, to prevent draughts.

The chief merit of a fire-proof floor is the prevention of flame passing from one story to another. This advantage is lost if the stories are connected with wooden chutes, dumb-waiter shafts, or even with channels in the wall for the passage of electric light wires, gas, water and other pipes.

308. SKYLIGHTS.—If more than three feet square (nine square feet), add for each nine square feet or fraction thereof in excess (not exceeding a total of 10 cents.) .... 1 ct.

(If metallic frames and heavy deck or prismatic glass or wire glass, no charge.)

309. SKYLIGHTS.—If covered above and below with approved wire netting, one-half charge..................

310. STREETS.—If street on which building fronts is less than 60 feet wide from building to building (*i. e.*, including sidewalks), and not less than 50, add (unless opposite side of street is vacant)...................... 2 cts.

311. STREETS.—For each 5 feet less than 50 in width, unless opposite side of street is vacant, add........... 2 cts.

312. OVERHEAD WIRES, TELEGRAPH, ETC., on poles in front of building in sufficient number to interfere with operations of fire department, charge according to quantity not less than................................ ½ ct.

313. NUMBER OF TENANTS (other than office and dwelling tenants.)—For each tenant in excess of one, add 1 ct.

313a. MANUFACTURING RISKS.—Charge 1 cent for every 10 operatives employed in excess of 20 not exceeding a total of 10 cents in risks where first column charge does not exceed 25 cents, and double this amount in wood working and other hazards where first column charge exceeds 25 cents, but not exceeding a total of 25 cents.............

This charge is probably self-explanatory, and corresponds with 106b, non-fire-proof structures.

314. LIGHTING.—If by electricity with system and installation in compliance with underwriter's rules and specifications (if not in compliance, see No. 388) add....... 1 ct.

315. STONE PIERS, stone columns, pillars, or brick piers with bond stones or cap stones, carrying important weights, especially if supporting beams or girders in basements, cellars, etc., charge according to number, not less than .... 2 cts.

Note that the charge for pillars, piers, etc., is for those carrying important weights, especially in cellars where they could not be reached by the fire department. Where pillars are located on the street front, are simply ornamental, and carry only stone lintels for porches, and are not at all vital to the structure, they should not be charged for.

316. TOTAL DEFICIENCIES PLUS KEY-RATE....

DEDUCTIONS FOR EXCEPTIONAL CONSTRUCTION.

317. FLOORS.—If fire-proof surfaces of cement, concrete or asphalt, deduct................................ 5 %

318. FLOORS.—If water-proof, arranged with waste-ways and scuppers and inclined to carry off surplus water thrown by department to sewer or street, deduct........... 5 %

319. FIRE-PROOF WOOD, OR OTHER FIRE-PROOF TRIM, deduct........ .... 5 %

320. RESULT.—*UNOCCUPIED BUILDING RATE.*

321. OCCUPANCY.—Add *one-half* amount named in first column of table of occupancies, page 143.

322. RESULT.—*OCCUPIED BUILDING RATE.*

Subject to any deductions to which risk may be entitled, Nos. 340, 341, etc., page 73.

Deduct for Exceptional City Fire Department, page 47.

323. EXPOSURES.—Charge for exposures, according to hazard, especially if "skeleton" construction and even if the exposure is sufficient only to damage paint, glass, etc. (See note, page 39.)

324. RESULT.—NET RATE OF BUILDING *OCCUPIED AND EXPOSED.*

Subject to deductions for Sprinklers (see rule, p. 51) and Co-insurance.

325. CO-INSURANCE ON "FIRE-PROOF" BUILDINGS.—For insurance not exceeding 15% of the value of building, charge full rate obtained by the Schedule at No. 324. For any percentage of value in excess of 15% take the rate as shown in the following table:

(For explanation of Table see page 112.)

326. RESULT.—RATE OF BUILDING OCCUPIED WITH......% CO-INSURANCE......................

No office building to be rated below 5 cents and no mercantile building below 10 cents after deducting for co-insurance.

(To which add for any faults of Management. Page 76.)

RATE No. 324 of Universal Schedule.*	PERCENTAGE OF INSURANCE TO VALUE.									
	20 %	30 %	40 %	50 %	60 %	70 %	75 %	80 %	90 %	100 %
	cents.	cents.	cents.	cents.	cents.	cents.	cents.	cents.	cents.	cents.
15 cts.	12.95	10.35	8.67	7.45	6.52	5.77	5.46	5.16	4.63	4.20
16 "	13.81	11.04	9.24	7.95	6.96	6.16	5.82	5.50	4.94	4.48
17 "	14.67	11.73	9.82	8.44	7.39	6.54	6.18	5.84	5.25	4.76
18 "	15.53	12.42	10.40	8.94	7.83	6.93	6.55	6.19	5.56	5.04
19 "	16.39	13.11	10.98	9.44	8.26	7.31	6.91	6.53	5.87	5.32
20 "	17.26	13.80	11.56	9.94	8.70	7.70	7.28	6.88	6.18	5.60
21 "	18.12	14.49	12.13	10.43	9.13	8.08	7.64	7.22	6.48	5.88
22 "	18.98	15.18	12.71	10.93	9.57	8.47	8.00	7.56	6.79	6.16
23 "	19.84	15.87	13.29	11.43	10.00	8.85	8.37	7.91	7.10	6.44
24 "	20.71	16.56	13.87	11.92	10.44	9.24	8.73	8.25	7.41	6.72
25 "	21.57	17.25	14.45	12.42	10.87	9.62	9.10	8.60	7.72	7.00
26 "	22.43	17.94	15.02	12.92	11.31	10.01	9.46	8.94	8.03	7.28
27 "	23.30	18.63	15.60	13.41	11.74	10.39	9.82	9.28	8.34	7.56
28 "	24.16	19.32	16.18	13.91	12.18	10.78	10.19	9.63	8.65	7.84
29 "	25.02	20.01	16.76	14.41	12.61	11.16	10.55	9.97	8.96	8.12
30 "	25.89	20.70	17.34	14.91	13.05	11.55	10.92	10.32	9.27	8.40
35 "	30.20	24.15	20.23	17.39	15.22	13.47	12.74	12.04	10.81	9.80
40 "	34.52	27.60	23.12	19.88	17.40	15.40	14.56	13.76	12.36	11.20
45 "	38.83	31.05	26.01	22.36	19.57	17.32	16.38	15.48	13.90	12.60
50 "	43.15	34.50	28.90	24.85	21.75	19.25	18.20	17.20	15.45	14.00
55 "	47.46	37.95	31.79	27.33	23.92	21.17	20.02	18.92	16.99	15.40
60 "	51.78	41.40	34.68	29.82	26.10	23.10	21.84	20.64	18.54	16.80
65 "	56.09	44.85	37.57	32.30	28.27	25.02	23.66	22.36	20.08	18.20
70 "	60.41	48.30	40.46	34.79	30.45	26.95	25.48	24.08	21.63	19.60
75 "	64.71	51.75	43.35	37.26	32.61	28.86	27.30	25.80	23.17	21.00
80 "	69.04	55.20	46.24	39.76	34.80	30.80	29.12	27.52	24.72	22.40
85 "	73.35	58.65	49.13	42.24	36.97	32.72	30.94	29.24	26.26	23.80
90 "	77.67	62.10	52.02	44.73	39.15	34.65	32.76	30.96	27.81	25.20
95 "	81.98	65.55	54.91	47.21	41.32	36.57	34.58	32.68	29.35	26.60
100 "	86 30	69.00	57.80	49.70	43.50	38.50	36.40	34.40	30.90	28.00

*N. B.—For any intermediate rate combine two of above; for example, the rate of 31 cents would be that for 15 cents and 16 added; the rate for 32 would be double that for 16.

For example, if the rate be 80 cents and the percentage of insurance carried (percentage co-insurance clause in the policy) is 50% the rate will be 50% of 80, or 39.76 cents. If the rate at No. 324 be 50 cents, for 60% co-insurance the rate would be 44% of 50 cents, or 21.75 cents, etc., etc.

TO OBTAIN RATE ON STOCK IN FIRE-PROOF BUILDING.

cts.

Unoccupied Building Rate, No. 320................

Add the sum named in the *second* column of the table of occupancies, page 143..........................

Add one-half the amount named in the *first* column for the stock to be rated........................

Add, in case there be any other occupancy of building which increases the rate of the building by a greater amount named for the first column of the occupancy table than the risk to be rated, *one-half* the difference between such higher figure and that named for the risk (for example, retail drugs adding 10 cents to building, and a cigar store adding 5 cents, half the difference, 2½ cents, should be added to the stock rate on cigars)................................

If the higher rated or excess hazard be separated from the stock to be rated by fire-proof partitions or floors, deduct 10% of the excess charge for each separating fire-proof floor or partition not exceeding fifty per cent. in all of such excess. For example, in the case cited, if five such separations occur, 50% of the 2½ cents excess of retail drugs, or 1¼ cents only, should be added to the cigar rate.

NOTE.—The final charge under this item should be made for that occupancy which gives the highest result, and not for *each* occupancy whose first column charge is greater than stock to be rated (the higher charge includes the less).

If Merchandise is stored above the 7th Floor, add to the rate of *each stock* in the building, *no matter on what floor located,* as many times three cents as the building has stories in height................

(For example, in a 10-story building occupied throughout for mercantile purposes, 30 cents would be added; in an 11-story building, 33 cents, etc.)

Merchandise should not be stored at a greater height from the street grade than 85 feet, even with the best fire department. At that height it is liable to wreck the building and affect every stock in the building, as well as the building itself, see Note 297 a.

Stocks Above or Below Grade Floors.—Charge as many times 5 cents as the floor on which stock is located is stories ABOVE THE FOURTH OR BELOW THE GRADE. If distributed over two or more floors for same assured, and with 80% co-ins., and cut off each story, three-fourths of average charge.

For example, merchandise on the fifth floor should pay 5 cents; on the sixth floor, 10 cents; seventh floor, 15 cents; on all, 30 cents; average 10 cents, three-fourths of which, 7½ cents (if cut off each story), is the proper charge for same stock covering these three floors.

Grade Floor Stocks.—Deduct for stock entirely on grade floor, 20%; if on second, deduct 10%; if stock extends over grade and second, deduct 15%; if on grade and also floors below grade, deduct 5 %.

Forward..................

Brought forward.............................. cts.

Public Warehouses and Storage Stores **Bonded**, complying with rules of Local Board, deduct 33⅓%.

Public Warehouses and Storage Stores **Free**, 25%...

Private Warehouses.—Original unbroken packages only, 20%. Sales by sample only, 15%. Delivery of broken packages, 10%.........................

327. ....

Subject at this point to any deductions to which risk may be entitled, No. 357, &c., page 74..............

Deduct for Exceptional Fire Department, if any, page 50 ....

Add for **Exposure** according to hazard..............

329. **Result.—Rate of Stock, subject to Sprinklers and Co-Insurance**..................................

329a. **Automatic Sprinklers.**—See rule, page 51.

330. **Co-Insurance on Stocks** in fire-proof buildings, if policy covers only one floor, or more than one but *not cut off* at each story, ¼ of 1% for each 1% of co-insurance in excess of 20% of value (15% for 80%). If policy covers two floors *cut off* at each story, 20%; three floors *cut off* each story 25%; four or more *cut off* at each story 30% for 80%.

In order to entitle a stock to the deductions above 15% for co-insurance for floors cut off at each story the enclosure must be of fire-proof material, with self-closing doors. If with heavy wood doors and heavy glass sashes, increase the 15% allowance *one-third* of the difference between 15% and the maximum credit for standard cut-offs, to which stock might be entitled according to the number of floors upon which it is located. If the doors be metal covered or kalameined, but are not thoroughly standard, or have wood sills, or do not fit openings closely, increase the 15% allowance *two-thirds* of the difference.

Deductions for 80% co-insurance clause by above rules are as follows:

Stock Distributed Over	Wood Doors.	Non-Standard Fire Doors.	Standard Doors.
2 floors	16⅔%	18⅓%	20%
3 "	18⅓%	21⅔%	25%
4 " or more	20%	25%	30%

No stock to be rated below 15 cents.

NOTE.—In rating stocks in fire-proof buildings, it should be borne in mind that, no matter how fire-proof a building may be, there is no more reason why the combustible merchandise or contents of any one of its stories, once ignited, should not be effectually destroyed than there is why the fuel in a stove should not be consumed. So far, therefore, as stocks in fire-proof buildings are concerned, the only advantage of a fire-proof building over one of ordinary construction is to protect its contents against outside exposures and to confine a fire to a single floor or room—a consideration which makes it exceedingly important to insist upon co-insurance, especially

Forward..................

Brought forward.............................. cts.

where the policy covers throughout the entire structure. Otherwise a company may be as effectually carrying a number of separate risks for one premium as if insuring the contents of a number of separate brick stores under one sum. Under some circumstances, merchandise in the upper stories of a fire-proof building might be a poorer fire risk than on the grade floor of an ordinary building.

331. **Result.—Rate on Stock with ...% Co-Insurance....**

Add for Faults of Management, page 76..............

Minimum Rates.—No office building to be rated below 5 cents and no mercantile building below 10 cents, and no stock below 15 cents, after deducting for co-insurance and sprinklers.

332. **Jewelry in Safes** with full co-insurance in fire-proof buildings may be insured at 25 % more than the rate of building occupied.

DEDUCTIONS FOR FIRE-PROOF BUILDINGS.

340. **Hydrants, Etc.**—If building within 300 feet of one post or flush hydrant, supplied by 8-inch or larger water-pipe, deduct............................ 4 % of final bldg rate. (322)

341. " If within 300 feet of two or more hydrants, supplied by 8-inch or larger water-pipe, deduct...... .. .. 6 % " "

342. " If said water-pipe be fed at both ends by mains or sub-mains, deduct an additional.................. .... 4 % " "

343. **Automatic Fire Alarm.**—For approved telegraph signal to a central or fire department station, with thermostats, deduct...................... 5 % " "

343a. **Special Building Call Direct to Fire Department,** with approved telegraphic call box each floor, deduct.... 2 % " "
(One-half allowance if no watchman.)

344. **Stand-Pipes—External,** for use of fire department, with siamese or double connections, deduct.................. 3 % " "
NOTE.—This provision important, as it saves time of carrying hose to the top of a high building.

345. **Stand-Pipes—Internal,** supplied from tank, with hydrants and hose attached at each floor at landings, deduct..... 1 % " "

346. **Basement and Sub-Cellar Sprinklers.** If perforated 2½-inch pipe be provided in basement and sub-cellar, with attachment at street grade for fire department, standard size of thread and coupling, and standard butt and with waste-ways to sewer, deduct........ 2 % " "

Forward.................

Deduct cts.

Brought forward...............................

347. **Automatic Sprinklers in Basement** and sub-cellars. If approved installation, deduct (no deduction if allowance has been made for sprinklers throughout building)............... 5 % of final bldg. rate (322.)

348. **Office Occupancy.**—If building occupied throughout exclusively for offices, deduct..... ....20 % " "

349. " If building occupied above grade floor exclusively for offices, deduct........10 % " "

350. **Roof Hydrants**, protected from freezing, deduct .... 1 % " "

351. **Casks of Water** or filled pails (at least six filled pails to each 2,500 square feet of floor area), deduct........... 5 % " "

352. **Watchman.**—If watchman (on premises) with watch clock, deduct.......10 % " "

N. B.—If automatics, No. 343 only one-half deduction for watchman.

353. **Auxiliary Private Fire Plant**, Force Pump, Etc., available for day, night and holidays; stand-pipe, hose attached at each floor; competent engineer on hand at all times, deduct....10 % " "

(This in addition to 344, 345 and 352.)

TOTAL....

DEDUCTIONS FROM STOCK RATES, FIRE-PROOF BUILDINGS.

The following deductions for exceptional features may be made from the rate on stocks obtained by the rule explained on page 71. The percentage to be deducted is the percentage of the said total stock rate (No. 327):

357. **Hydrants, Etc.**—If building within 300 feet of one post or flush hydrant, supplied by 8-inch or larger water-pipe, deduct.............................. 4 % of final stock rate (327.)

358. " If within 300 feet of two or more hydrants, supplied by 8-inch or larger water-pipe, deduct................. 6 % " "

359. " If said water-pipe is fed at both ends by mains or sub-mains, deduct an additional............................ 4 % " "

360. **Fire Patrol.**—For salvage corps or fire patrol, if supported by city, deduct... 3 % " "

If supported by the Insurance Companies, no deduction. (Having paid for it they are entitled to it.)

Forward..................

		Deduct cts.
Brought forward..............................		
361. **Covers, Tarpaulins.**—If merchandise covered by tarpaulins or other water-proof covers each night, deduct....... (These covers may be made fire-resisting by fire-proofing processes.)	5 % of final stock rate (327.)	
362. **Proximity to Fire Engine House, Etc.**—If risk to be rated is within 300 feet of a fire engine house or hose house, which should insure prompt response of skilled men to any fire alarm, deduct,	2 % " "	
If next door or opposite side street....	5 % " "	
363. **Basement and Sub-Cellar Sprinklers.**—If perforated 2½-inch pipe be provided in basement and sub-cellar, with attachment at street grade for fire department with standard size of thread and coupling, and standard butt and with water-ways to sewer, and merchandise be on skids, deduct.........	2 % " "	
364. **Automatic Sprinklers in Basement** and sub-cellars. If approved installation, deduct .... (Unless deduction has been made for sprinklers throughout building, in which case no allowance for this.)	5 % " "	
365. **Casks of Water** or filled pails on each floor, deduct....................... NOTE.—To receive above deduction there must be at least 6 filled pails for each 2,500 square feet of floor area.	5 % " "	
366. **Tin-Covered Cases.**—If merchandise be kept in tin-covered, wooden side-wall and other cases, deduct	5 % " "	
367. **Office Occupancy.**—If building above grade floor is occupied entirely for offices, deduct.....................	5 % " "	
368. " If offices and dwelling..............	10 % " "	
369. **Watchman.**—If watchman on premises but no watch-clock, deduct...........	5 % " "	
370. " If watchman on premises with watch clock or electric detector, deduct...... NOTE.—One-half deduction if automatic alarm No. 374.	10 % " "	
371. **Stand-Pipes—Internal,** supplied from tank, with hydrants and hose attached at each floor at landings, deduct......	1 % " "	
372. **Stand-Pipes—External,** for use of fire department, with siamese connections, deduct	2 % " "	
373. **Chemical Engines on Wheels.**—If one or more chemical engines are available in case of fire, deduct	5 % " "	
Forward......		

		Deduct cts.
Brought forward		
374. **Automatic Alarm.**—For approved automatic fire alarm telegraph signal to a central station or fire dept. station with thermostats, deduct	5 % of final stock (rate 327.)	
374a. **Special Building Call Direct to Fire Department**, with approved telegraphic call box each floor, deduct... (One-half allowance if no watchman.)	2 % " "	
375. **Skids.**—If merchandise on skids or platforms, deduct	2 % " "	
376. **Auxiliary Private Fire Plant.** Force Pump, Etc., available for day, night, and holidays; stand-pipe, hose attached at each floor; competent engineer on hand at all times, deduct (This in addition to 369, 371 and 372.)	5 % " "	
377. Floors arranged for carrying off water with scuppers	5 % " "	
TOTAL...		

ADD FOR FAULTS OF MANAGEMENT, IF ANY.

380. If bottom of elevator-shaft is used for store-room, coat closets or lamp and oil closets, charge .... 10 cts.

381. Swinging gas brackets unprovided with stops, or within 36 inches of wood-work overhead, or otherwise unsafe (ditto as to bracket lamps), for one, add not less than .... 5 "
For each additional one add 1 cent.

382. Untidiness, as to rubbish, ashes, etc., especially in cellar, charge not less than .... 10 "

383. Empty boxes, rubbish and barrels in rear yards or alleys .... 2 "

384. Lights in show windows, open or unprotected .. 5 "

385. Sawdust spittoons or sawdust on floors, especially in drug and oil stores .... 5 "

386. If kerosene is used on floors when sweeping ..... 10 "

387. Ash and waste cans to be of metal. If not, charge .... 10 "

388. If lighted by electricity, with system and instalation not in compliance with board rules, or in unsafe condition, or if arc lights be not provided with wire or metallic screens above and below, or tight globes to prevent fall of carbons, charge .... 25 "

389. Crowded Mdse. without proper aisles opposite or too near windows, not less than .... 5 "

FOR RATING COMBINED FIRE-PROOF AND NON-FIRE-PROOF BUILDINGS WITHOUT STANDARD CUT-OFFS. See rule, page 94.

RATING SLIP.—FIRE-PROOF BUILDINGS.

*Survey No.*________ *Inspected by* ________

Date ________ 190__

EDITION JANUARY 1902.

UNIVERSAL MERCANTILE SCHEDULE.

*Risk*________ *No.*________ ________*Street,*

*Stock of*________ *in* ________ *Story* ________*Bldg.*

*Ins. Map, Page*________ *Block*________ *City of*________

DEFICIENCIES.	No.	Charge.
N B For full explanation refer, by No of Item to the Schedule		

KEY-RATE OF CITY (See page 13)........................

WALLS 286 SKELETON CONSTRUCTION, wrought iron or steel columns or vertical supports (*no charge for cast-iron*), charge 05

287 If average thickness of two side or bearing walls (or either of them) less than 20 inches charge for EACH INCH deficiency 02

If any portion of wall less than 12 inches, double the charge . .

288 STONE FRONTS OR SIDE WALLS or veneered with stone ashler, charge for each if plain or 'axed' finish .01, if carved or ornamental. . . .03

289 POOR BRICKS or poor quality mortar 20

UNPROTECTED IRON—290 Charge as follows, for unprotected cast-iron columns .10; unprotected wrought-iron or steel columns .15, unprotected lower flanges of beams 02

One half above charges in hotel or office buildings

CEILING OR SHEATHING—291 Wood or strawboard CEILING, one story, not less than .01, each additional story ½ cent

292 Wood or strawboard SIDING, one story .01, each additional story ½ cent

AREA—(Ground floor) . ft × ft Total sq ft

293 5,000 sq ft to 10,000, charge for each 1,000 in excess of 5,000 ½ of .01

294 If over 10,000 sq ft charge for each 1,000 in excess of 10,000 (not exceeding a total of .40) 04

If mercantile building exceeds ten stories, double area charge

If building occupied exclusively above grade floor for offices or dwellings, no charge for area.

HEIGHT—(....Stories) 295 For each story over eight up to twelve, charge .01

296 For twelfth and each story over twelve up to fifteen 03

297 For fifteenth and each story over fifteen . . .10

If building occupied exclusively above grade floor for offices or dwellings, make one-fourth charge for height. Office buildings may be 10 stories without charge

MERCHANDISE ABOVE 7th FLOOR—297a Charge .15 and add .02 more for each floor over seventh up to tenth, and .05 more for tenth and each floor above tenth For example, an eleven story building would have .29 added

FLOORS—298 WOODEN FLOOR BOARDS laid solid on concrete without air space .10, with air space .15 (one half charge in office buildings

298a FLOOR ARCHES, if concrete cement or approved plaster composition with iron centres or supports (such as Metropolitan, Roebling, Expanded Metal, Fawcett, Columbian, Bailey, Guastavino) (*no charge for brick or terra-cotta arches*) 10

If on exposed corrugated iron centres .15. If flat arch supported on iron (such as Rapp) .20

If space between floor beams exceeds 5 ft charge for each excess foot .02

One half floor charges in office or hotel buildings

ELEVATORS—299 Not cut off according to standard, but in hallway or enclosed court, or if provided with automatic trap doors, charge .06

300 Open 12

301 Wooden shaft (if approved metal covering half charge). 15

For each additional elevator not cut off add 02

One third charge for elevators in office or hotel buildings

STAIRWAYS—302 Enclosed in wood lath and plaster hallway, or provided with automatic trap doors in floors 05

303 Enclosed in wood with self closing doors each floor 10

304 Open, charge not less than .01 each floor, not exceeding a total of .12

If more than one stairway charge for worst and add one fourth charge for each additional One third charge for stairs in office or hotel buildings

One half charge for 299, 300 or 301 if charge for 302, 303 or 304 half the smaller charge

If elevator and stairway are combined in the same shaft or opening, only one charge for the two

305 If at least one STAIRWAY IS NOT FIRE PROOF with metal treads under stone treads (no charge for hardwood treads over iron), charge as many times .02 as building has floors (one third charge for office building) If stairway in fire-proof hall or enclosure protecting treads from heat, one-half final charge.

WELL-HOLES—306 Add for each floor pierced, not less than. 03

No charge in office or hotel buildings

CHUTES, DUMB-WAITERS, VENT. SHAFTS (unless fire proof shaft), and small floor openings 307 For each floor pierced not less in each case than .02

No charge for steam or water pipes if space around the same is filled in with mineral wool, or other incombustible material, and properly arranged to prevent draughts and leakage

SKYLIGHTS—308 If of thin glass (less than ¼ inch), or if unprotected wooden frames charge for each 9 sq ft in excess of 9 sq ft (not exceeding a total of .10) . .01

If skylight is monitor style, charge for square feet in sides as well as top If protected above and below with approved wire netting or if ¼ inch glass, one-half charge

Same charge for floor lights less than ¾ inches thick

STREET—310 If street on which building fronts is less than 60 feet wide but over 50 02

311 If under 50 feet, add for each 5 feet less 02

WIRES—312 Overhead to interfere with fire dept, not less than . ½ cent.

TENANTS 313 Each in excess of one, exclusive of office and dwelling tenants 01

313a If MANUFACTURING RISK add .01 for every 10 operatives employed in excess of 20 not exceeding a total of .10 In risks where first column charge does not exceed .25. In wood working and other hazards where first column charge exceeds .25, double the charge but total not to exceed .20

LIGHTING 314 Electricity, approved (if unsafe see No 388) add .01

STONE PIERS—315 Stone columns, pillars, or brick piers with bond stones, especially supporting beams or girders in basements etc, charge according to number, not less than .02

316 TOTAL DEFICIENCIES PLUS KEY RATE . .

DEDUCT FOR EXCEPTIONAL CONSTRUCTION.	No.	%
317 For fire-proof floor surfaces of cement, concrete or asphalt. . . .5%		
318 Floors water proof and inclined with scuppers to carry off surplus water . 5%		
319 Fire proof wood-work, trim, etc . 5%		
TOTAL		%

320 RATE OF BUILDING UNOCCUPIED . . .

Add for occupancy—(one half amount in first column of table, page 143) . . .

(Select charge for most hazardous occupancy)

322 RESULT—RATE OF BUILDING OCCUPIED . . . .

DEDUCTIONS FOR FIRE APPLIANCES, ETC. ON BUILDINGS.	No	Per Ct
340 Hydrants, if one supplied by 8 inch water main, within 300 ft 4%		
341 Two or more within 300 feet 6%		
342 If said water pipe be fed at both ends by mains 4% (10% in all)		
343 Automatic fire alarm, telegraphic signal to central station or fire department house . . . 5%		
343a Special building call direct to fire department (one half allowance if no watchman) 2%		
344 Standpipe external with siamese connection, for use of fire department 3%		
345 Standpipe internal, with tank supply and approved hose 1%		
346 Basement and sub-cellar perforated pipe sprinklers 2%		
347 Automatic sprinklers in basement (no deduction if allowance has been made for sprinklers throughout building) 5%		
348 If building occupied exclusively for offices or dwellings, or both 20%		
349 If occupied exclusively for offices or dwellings, or both, above grade floor . 10%		
350 Roof hydrants protected from freezing 1%		
351 Casks of water or filled pails on each floor (6 pails to 2500 sq ft floor area) 5%		
352 If watchman registers with clock or electric detector. . 10%		
353 Auxiliary private fire plant, force pump, etc. 10%		
TOTAL DEDUCTIONS		%

EXCEPTIONAL CITY FIRE DEPARTMENT—184 Extra steamers ½ of 1% for each in excess of five (not exceeding 20% in all) 185 Water tower if one 2½%, if two 5% 186 Fire boat available 5% 186a Gravity Pressure, for each effective fire stream available at risk supplied by a gravity pressure of not less than 40 lbs at base of nozzle, by hydrant on 8 inch or larger main deduct 1% (not exceeding a total of 15%) If 6 inch main one half deduction.

These are increased . . . but only one-half the foregoing deductions (except No 186) in case supply main from reservoir is cut in line of . . . unless precautions are taken by city to prevent freezing of hydrants See rule page 47

TOTAL . . . . %

322 RESULT—Net rate of building occupied unexposed . . . .

323 EXPOSURE—If any, add according to hazard . . . .

323a AUTOMATIC SPRINKERS —See rule page 51 . . . .

324 RESULT Net rate building occupied and exposed. FORWARD. . . . .

824 NET RATE OF BUILDING OCCUPIED AND EXPOSED. BROUGHT FORWARD..........

825 CO-INSURANCE ON "FIRE-PROOF" BUILDINGS.

For insurance not exceeding 15% of the value of building, charge full rate obtained by the Schedule at No 824. For any percentage of value in excess of 15% take the following percentage of the rate, viz for **20%** of value, 86% of the rate, for **30%**, 69% of rate; for **40%**, 58%, for **50%**, 50%, for **60%** 44%, for **70%**, 39%, for **75%**, 36½%, for **80%** 34%, for **90%** 31%, for **100%**, 28%. The following table will show the proper rate for any percentage of co insurance

RATE No. 324 of Co-terms Schedule*	Percentage of Insurance to Value.									
	20 %	30 %	40 %	50 %	60 %	70 %	75 %	80 %	90 %	100 %
	cents.	cents	cents.	cents.	cents	cents	cents.	cents.	cents	cents.
15 cts	12.95	10.35	8.67	7.45	6.52	5.77	5.46	5.16	4.63	4.20
16 "	13.81	11.04	9.24	7.95	6.96	6.16	5.82	5.50	4.94	4.48
17 "	14.67	11.73	9.82	8.44	7.39	6.54	6.18	5.84	5.25	4.76
18 "	15.53	12.42	10.40	8.94	7.83	6.93	6.55	6.19	5.56	5.04
19 "	16.39	13.11	10.98	9.44	8.26	7.31	6.91	6.53	5.87	5.32
20 "	17.26	13.80	11.56	9.94	8.70	7.70	7.28	6.88	6.18	5.60
21 "	18.12	14.49	12.13	10.43	9.13	8.08	7.64	7.22	6.48	5.88
22 "	18.98	15.18	12.71	10.93	9.57	8.47	8.00	7.56	6.79	6.16
23 "	19.84	15.87	13.29	11.43	10.00	8.85	8.37	7.91	7.10	6.44
24 "	20.71	16.56	13.87	11.92	10.44	9.24	8.73	8.25	7.41	6.72
25 "	21.57	17.25	14.45	12.42	10.87	9.62	9.10	8.60	7.72	7.00
26 "	22.43	17.94	15.02	12.92	11.31	10.01	9.46	8.94	8.03	7.28
27 "	23.30	18.63	15.60	13.41	11.74	10.39	9.82	9.28	8.34	7.56
28 "	24.16	19.32	16.18	13.91	12.18	10.78	10.19	9.63	8.65	7.84
29 "	25.02	20.01	16.76	14.41	12.61	11.16	10.55	9.97	8.96	8.12
30 "	25.89	20.70	17.34	14.91	13.05	11.55	10.92	10.32	9.27	8.40
35 "	30.20	24.15	20.23	17.39	15.22	13.47	12.74	12.04	10.81	9.80
40 "	34.52	27.60	23.12	19.88	17.40	15.40	14.56	13.76	12.36	11.20
45 "	38.83	31.05	26.01	22.36	19.57	17.32	16.38	15.48	13.90	12.60
50 "	43.15	34.50	28.90	24.85	21.75	19.25	18.20	17.20	15.45	14.00
55 "	47.46	37.95	31.79	27.33	23.92	21.17	20.02	18.92	16.99	15.40
60 "	51.78	41.40	34.68	29.82	26.10	23.10	21.84	20.64	18.54	16.80
65 "	56.09	44.85	37.57	32.30	28.27	25.02	23.66	22.36	20.08	18.20
70 "	60.41	48.30	40.46	34.79	30.45	26.95	25.48	24.08	21.63	19.60
75 "	64.71	51.75	43.35	37.26	32.61	28.86	27.30	25.80	23.17	21.00
80 "	69.04	55.20	46.24	39.76	34.80	30.80	29.12	27.52	24.72	22.40
85 "	73.35	58.65	49.13	42.24	36.97	32.72	30.94	29.24	26.26	23.80
90 "	77.67	62.10	52.02	44.73	39.15	34.65	32.76	30.96	27.81	25.20
95 "	81.98	65.55	54.91	47.21	41.32	36.57	34.58	32.68	29.35	26.60
100 "	86.30	69.00	57.80	49.70	43.50	38.50	36.40	34.40	30.90	28.00

*N B For any intermediate rate combine two of above for example, the rate of 31 cents would be that for 15 cents and 16 added, the rate for 32 would be double that for 16

826 RESULT—RATE OF BUILDING OCCUPIED WITH . . % CO-INSURANCE ....

ADD FOR FAULTS OF MANAGEMENT IF ANY. No Charge

380 If bottom of elevator shaft used for oil, coat or other closets 10
381 Swinging gas brackets or bracket lamps, within 36 inches of combustible ceilings, etc , for one... 05
for each additional............... 01
382 Untidiness, rubbish, ashes, etc , especially in cellar 10
383 Empty boxes, rubbish, etc , in rear yards or alleys 02
384 Lights in show-windows, open, unprotected 05
385 Sawdust spittoons or sawdust on floors 05
386 Kerosene used to sprinkle floors 10
387 Ash and waste cans not metal .. 10
388 Electric light system and installation not in compliance with underwriters' rules, or arc lights unprotected 25
389 Crowded merchandise without proper aisles, opposite or too near windows, not less than.... .... .05

TOTAL. . .. .

FINAL RATE ON BUILDING—(Including co-insurance, charges for faults of management, etc)
MINIMUM RATE —No office building to be rated below 5 cents or mercantile building below 10 cents after all deductions including co-insurance have been made

TO OBTAIN RATE ON STOCK IN FIRE-PROOF BUILDING.

RATE OF BUILDING UNOCCUPIED, No. 820.... .. ..
Add rate named in second column of occupancy table, page 143, of stock to be rated (occupancy No . ... .)
Add *one-half* the amount named in the first column for the stock to be rated . ..
Add, in case there be any other occupancy of building which increases the rate of the building by a greater amount named for the first column of the occupancy table than the risk to be rated, *one-half* the difference between such higher figure and that named for the risk (for example retail drugs adding 10 cents to building, and a cigar store adding 5 cents, half the difference, 2½ cents should be added to the stock rate on cigars) ..

If the higher rated or excess hazard be separated from the stock to be rated by fire-proof partitions or floors, deduct 10% of the excess charge for each separating fire proof floor or partition not exceeding fifty per cent in all of such excess For example, in the case cited, if five such separations occur 50% of the 2½ cents excess of retail drugs, or 1¼ cents only, should be added to the cigar rate

NOTE — The final charge under this item should be made for that occupancy which gives the highest result, and not for *each* occupancy whose first column charge is greater than stock to be rated (the higher charge includes the less

If Merchandise is stored above the 7th Floor, add to the rate of *each stock* in the building, *no matter on what floor located*, as many times 3 cents as the building has stories in height

For example, in a 10 story building occupied throughout for mercantile purposes, 30 cents would be added, in an 11 story building 33 cents, etc

STOCKS ABOVE OR BELOW GRADE FLOORS—Charge as many times 5 cents as the floor on which stock is located is stories *above the fourth or below the grade* If distributed over two or more floors for same assured, and with 80% co ins , and cut off each story, three-fourths of average charge

For example, merchandise on the fifth floor should pay 5 cents, on the sixth floor 10 cents, seventh floor 15 cents, on all 30 cents, average 10 cents, three-fourths of which 7½ cents (if cut off each story) is the proper charge for same stock covering these 3 floors

GRADE FLOOR STOCKS Deduct for stock entirely on grade floor, 20%, if on second, deduct 10%; if stock extends over grade and second, deduct 10%, if on grade and also floors below grade, deduct 5% .. . .
PUBLIC WAREHOUSES and Storage Stores **BONDED**, deduct 33⅓% ......
PUBLIC WAREHOUSES and Storage Stores **FREE**, deduct 25% ......
PRIVATE WAREHOUSES—Original unbroken packages only, 20% Sales by sample only, 15%. Delivery of broken packages, 10% . . . .

827 TOTAL. . ...

DEDUCTIONS FOR FIRE APPLIANCES, ETC. ON STOCKS. No. Per Ct.

357 Hydrants, if one, supplied by 8-inch water main, within 300 ft 4%
358 Two or more supplied by 8 inch water main, within 300 ft 6%
359 Water pipe fed at both ends by mains additional . . 4% (10% in all)
360 Fire patrol, supported by city, (if by insurance companies, nothing) 8%
361 If merchandise covered by tarpaulin covers, each night .. . 5%
362 Proximity to fire department station, hose or hook and ladder house, if risk within 300 feet, 2%, if next door or on opposite side of street 5%
363 Basement and sub-cellar perforated pipe sprinklers, if goods on skids 2%
364 Automatic sprinklers in basement (no deduction if allowance has been made for sprinklers throughout building) 5%
365 Casks of water or filled pails (at least six filled pails to each 2,500 square feet of floor area) 5%
366 Merchandise in tin covered cases 5%
367 If building occupied entirely above grade floor for offices... ..... 5%
368 " " " for office and dwelling...... . .... 10%
369 Watchman but no watch-clock 5%
370 Watchman with watch clock or electric detector (if automatics No 374 allow only ½ deduction for watchman).. . . . 10%
371 Standpipe, internal, with tank supply 1%
372 " external with siamese connection, for the use of fire dept 2%
373 If one or more chemical engines on wheels 5%
374 Automatic fire alarm to fire department 5%
374a Special building call direct to fire department (one-half allowance if no watchman) 2%
375 If merchandise on skids or platforms 6 inches high, deduct... .. .. 2%
376 Auxiliary private fire plant, force pump, etc 5%
377 Floors arranged with scuppers for carring off water......... ... 5%

TOTAL....................... %

EXCEPTIONAL CITY FIRE DEPARTMENT—219 Extra steamers, ½ of 1% for each one in excess of five (not exceeding a total of 15% in all) **220** Water-tower, if one, 2½%; if two, 5%. **221** Fire boat, available, 5% **221a** Gravity Pressure; for each effective fire stream available at risk, supplied by a gravity pressure of not less than 40 lbs. at base of nozzle, by hydrant on 8-inch or larger main, deduct ½ of 1% (not exceeding a total of 7½ %). If 6 inch main one-half deduction.

These percentages of last net amount, but only one half the foregoing deductions (except No 221) in case supply main from reservoir is not in duplicate or unless precautions are taken by city to prevent freezing of hydrants. See note page 50

TOTAL.. .... %

828 RESULT—Net rate on stock in unexposed building. . .. .
828a EXPOSURE -If any, add according to hazard . . . .
829 RESULT—RATE ON STOCK EXPOSED.... ....

829a AUTOMATIC SPRINKLERS—See rule page 51........ .... %
830 DEDUCT FOR CO-INSURANCE—If policy covers only one floor, or more than one but *not cut off* at each story, ¼ of 1% for each 1% of co-insurance in excess of 20% of value (15% for 80%) If policy covers two floors *cut off* at each story, 20%; three floors *cut off* at each story 25%, four or more *cut off* at each story 30% for 80% . .. .

In order to entitle a stock to the deductions above 15% for co-insurance for floors cut off at each story the enclosure must be of fire-proof material with self-closing doors If with heavy wood doors and heavy glass sashes, increase the 15% allowance *one third* of the difference between 15% and the maximum credit for standard cut offs to which stock might be entitled according to the number of floors upon which it is located If the doors be of metal-covered or "kalamined" but are not thoroughly standard, or have wood sills, or do not fit openings closely, increase the 15% allowance *two-thirds* of the difference

831 RESULT—NET RATE ON STOCK WITH........% CO-INSURANCE ....

ADD FOR FAULTS OF MANAGEMENT, IF ANY. 380, etc., above . . ..
FINAL RATE ON STOCK—(Including co-ins , charges for faults of management, etc.)..........
MINIMUM RATE—No stock to be rated below 15 cents after all deductions including co-insurance have been made.

HISTORY AND ANALYSIS

OF THE

Universal Mercantile Schedule.

By F. C. MOORE,

Chairman of the Universal Schedule Committee.

It is unnecessary to explain to Underwriters that by "schedule rating" is meant a specific, accurate measure from the view-point of advantage or disadvantage, by a scale of insurance rates or prices, for every feature of a building and its contents, of construction, occupancy, fire resisting or extinguishing provisions, and also of its environment or surroundings; involving in the latter, consideration of such features as the liability of the city in which the building is located to conflagrations; the width and grade of its streets; its previous fire record; its Police and Fire Departments, and, in fact, every consideration which an ideal underwriter, supposedly possessed of the knowledge and experience combined of all engaged in the business, would take into account in fixing a rate.

Inasmuch as natural sectional jealousies exist between citizens of one city or State as compared with another, and between different citizens of the same city, and inasmuch as such jealousies lead frequently to adverse legislation, it is obviously expedient that rates throughout the United States should be made upon one and the same basis, to say nothing of the honest duty, paramount to the rule of business expediency, which devolves upon underwriters, to treat all of their customers equitably and alike, in no case placing the burden of one class on the shoulders of another, by a system of "robbing Peter to pay Paul."

CAN AN INSURANCE SCHEDULE BE UNIVERSAL IN ITS APPLICATION?

If it be a fact—and probably no one will gainsay it—that a risk located in a section where the most favorable conditions and loss ratio justify low rates of premium—trans-

ported bodily by some process to a locality of the worst loss ratio and conditions, would still be a risk deserving of as low a rate except for hazards of its new environment and such local conditions as ought easily to be discovered by an intelligent observer on the ground and charged for, then it must follow that if a thousand risks transported in this manner to a new location should be found to show a greater mortality than in the old, the cause for the excess loss should be looked for in the new location and would be clearly outside of the hazards themselves. If, however, the mortality should remain the same, but a thousand risks constructed in the new location after the same model should show a greater mortality than the transported risks, any intelligent investigator would look for the cause in the new risks themselves, and would probably discover it in defective bricks and mortar or other faults peculiar to the place and therefore endemic or purely local.

No small portion of the adverse legislation in force to-day on the statute books of the various States has grown out of real or suspected invidious discrimination as to localities. If the man in Texas is rated by the same rule as the man in New York or New England he is satisfied. It has been wisely said that the average man is not so much exercised as to what rate he has himself to pay for insurance as to what "the other fellow" pays. A business man does not like to make a poor bargain; he feels especially dissatisfied if a rival in his own line of trade makes a better one; and if his rate is higher than that of his business competitor he must be convinced that there is a good reason for it. A dry-goods merchant in St. Louis, for example, visits Chicago or New York, and returns to his fellow-citizens with a statement that he finds a dry-goods stock in a brick, metal roof building in the city visited is rated at one-half the rate which he himself pays; the fact so briefly stated, is regarded as sufficient evidence of the need of interference by the Missouri legislature.

The description "a brick, metal roof building" is as far as the average layman usually gets into those features of a risk which enter into the consideration of rate. If, when he complains of unequal rating, he can be shown the items which make not only his own rate, but his own city, differ from the one with which he has compared his risk, he will be answered, if not convinced

It was claimed by some critics that a schedule could not be prepared which would properly rate risks in all parts of the country. The Committee believed otherwise, holding that local reasons could be found everywhere for abnormal losses, either in faults of construction, defective materials, deficiencies in fire departments, or other physical features.

Said a critic on one occasion, who had not read the schedule, "You cannot make a schedule which will rate in Connecticut and also in the South, where we lose two dollars for every dollar lost in the North."

"But why?" was the answer.

"Because the construction and other features in the South are so inferior to those of the North."

"Name them," was the reply.

"Well, in the South it is customary to sheathe side walls and ceilings with wood, generally inflammable yellow pine, in place of the old-fashioned and safer plaster of the Northern building. A fire is not only more likely to start with so much wood-work, but more likely to get beyond control. It is a bad feature of Southern risks."

"Granted," was the reply. "What else?"

"Well, in many portions of the South the bricks and mortar are of poor quality, causing the spread of fires from building to building."

"Granted; what else?"

"Well, on account of the heat of the climate the buildings in the South are constructed, as a rule, with air spaces or blind attics next the roof, which are objectionable, because if a fire gets into them it is almost impossible to extinguish it."

"Granted; what else?"

"Well, I think, the colored servants in many localities are careless with ashes in wooden boxes and barrels."

"Granted; the same fault is to be found in the North, however. Do you think of anything else?"

"No, not at this moment."

"Well, the Schedule treats of each of the faults you have mentioned, which ought to be charged for wherever met with—North or South—and it provides for some others quite as important. Let us see. Take, for example, a good brick building which would rate at, say, 50 cents in Connecticut or Massachusetts, with none of the faults referred to. Let us take a similar building in the South and see

how the schedule would handle it. If it has wooden sheathing on side walls and ceiling, for one story the charge would be 10 cents, and for each additional story 6 cents, so that if only two stories were so finished the rate instead of being 50 cents would be 66 cents, quite an increase—nearly a third more—but not more than it is worth. The charge is the same for this feature everywhere, however, North as well as South, and the fault is to be found in the North, although not so frequently as in the South.

"If, to proceed with the illustration, the building has defective bricks and mortar in the walls the charge is 20 cents, but, if in its flues, 20 cents more; the rate is now 106. If there is an air space of say 3 feet next the roof, 9 cents is added, making 115, and if the elevator shaft or stairway opens into this roof space making it worse in case a fire starts below (a fault you did not mention) 25 cents more is added. If ashes are kept in wooden boxes or barrels 25 cents is charged. So that without going further, the Schedule has increased the original rate of 50 cents materially but not more than it should, no matter where the risk is located. In a certain Southern town a property owner erected a building of the best burned brick, bringing a vessel load of them from the North for the purpose. Why should his rate not be 40 cents lower than that of his neighbors whose structures would hardly stand a good rain storm? If his carefulness is not recognized not only will injustice be done him but his example will not be followed."

NECESSITY FOR A PRINTED LIST OR SCHEDULE OF CHARGES.

The mere fact that there are more than a hundred features of construction in a single building which should enter into the consideration of its rate, irrespective of nearly forty features of its city or environment, nearly forty more different features of fire appliances, to say nothing of more than a thousand possible hazards of occupancy; and the further fact that no individual knowledge is equal to the task of putting a price upon so many items, nor any individual memory capable of remembering them, proves, without further demonstration, the necessity not only of conference to secure combined knowledge for fixing prices but, also, a printed record or schedule, to prevent omissions or mistakes.

In 1891 a committee of four underwriters was appointed to prepare a schedule for rating mercantile risks which should be universal in its application throughout the country. Early in their deliberations they reached the conclusion that such a schedule should be formulated upon the following lines, and that it should recognize :

First. A standard of environment—the city.

Second. A standard of construction—the building.

Third. An addition for the ignitibility and combustibility features of occupancy.

Fourth. An addition to all three of these to get the rate of any damageable contents (incidentally this latter to be varied in buildings which are not standard, because there should be less difference between the rate of the building and of its contents in buildings of poor construction than in buildings of standard construction.)

Fifth. An allowance on both building and stock for exceptional features of fire extinction, proximity to hydrants, engine houses, automatic fire alarms, etc., this being necessary to recognize the obvious difference between two risks of the same construction and occupancy even in the same city.

They decided, further, that those faults of management which lead to fires (more than 50 per cent. of the amount paid by Insurance Companies in each year being due to preventable causes) should be penalized—in most instances to the point of prohibition—and, in order to save the labor of computing net deductions in case these faults should be afterwards corrected or removed (as in 99 cases out of 100 they would promptly be if roundly charged for) they placed these charges outside of the schedule proper as final additions to the rate, after all deductions for fire-extinguishing appliances, co-insurance, etc., had been computed.

The Schedule prepared by this Committee, now known as the "Universal Mercantile Schedule," thus recognizes in its plan of arrangement :

First. A key-rate—as to which various cities and towns differ.

Second. Charges for variations from standards of construction—which ought to be the same everywhere.

Third. Charges for hazards of occupancy—which ought to be the same everywhere.

Fourth. Charges for insuring contents according to their susceptibility to damage—which ought to be the same everywhere.

Fifth. The variation of these charges, according to the construction of the building. Clearly the same amount should not be added, even for the same stock, to two different buildings where one is an exceptionally good building and the other an exceptionally poor one; there should be more difference between the building and stock rate in the one case than in the other.

Sixth. The treatment of fire extinguishing facilities, proximity to hydrants, etc., for the particular risk rated, according to circumstances; it being clear that if the risk is within reach of hydrants, steam engines, etc., and on an eight-inch or larger water main, it should rate differently from another of like kind, even in the same town, if the other risk be not so fortunately located.

The preparation of this Schedule occupied the constant labor of the Committee for nearly two years, and it was not finally promulgated until after it had been submitted, in six successive proofs, issued months apart, to underwriters throughout the United States, Canada and England, whose suggestions were finally considered in two conventions, one held in Hartford and the other in New York, the latter being largely attended by underwriters from various sections of the country.

Their first "proof" of the schedule was a short form intended to facilitate the easy rating of risks, without much detail, but they soon found that any schedule which did not penalize every fault of construction and encourage each meritorious feature of construction, fire prevention, and extinction would not only fail to secure improvements but would, in effect, penalize the good by encouraging and protecting the bad, and prove detrimental to the best interests of the insurance business and of the public as well. Faulty architecture is clearly encouraged by any system of insurance which does not charge for every fault and recognize every good point.

The Committee became convinced, moreover, that whatever time was saved in studying a short schedule would be more than lost afterwards in applying it, as the rating expert would certainly be delayed at every stage which

required consideration or thought. In the one item of area, for example, the first proof contained a charge for various areas without reference to the height of the building—an important factor in area—and without reference to whether or not a building was divided by cross or curtain walls, which not only strengthen structures but enable firemen to fight fires into corners, thus preventing the cumulative force of fires incidental to large, unbroken areas whose intense combustion is seldom extinguished. They found it necessary, also, to charge less for area in a single occupancy risk than in one of omnibus occupancy, where tenants, crowded upon single floors, have usually larger volumes of merchandise piled or tiered from floor to ceiling and where the rules of cleanliness are less likely to be observed.

So in other items or features of the schedule, the Committee found it necessary to go into every detail of hazard, leaving as little as possible to the judgment of a rating expert, so as not only to save his time in thought at every stage of the rating process, but to prevent, also, those inconsistencies of rating in risks of one and the same hazard, resulting from fluctuations of judgment, which so often produce dissatisfaction on the part of owners and result in appeals for legislative interference with rating organizations.

Before the Committee had issued their third "proof" they had abandoned all idea of a so-called short schedule, and had addressed themselves assiduously to the task of preparing one which should recognize every feature of a risk which ought to be considered, either in fixing a rate or determining a line. They now submit that the only test which should be applied to determine the question as to whether or not it is unnecessarily long is, that if there be a single item in it which ought not to be considered by an underwriter in fixing his rate or line, it should have been omitted, but if there be no such item, then the schedule cannot be too long.

If the result of their work is not correct, it can certainly be claimed for it that there is no other way to approach accuracy. It must, of course, be conceded that the work will be improved upon in coming years, but it is doubtful if any system of rating will ever proceed upon different lines to measure the varying hazards of varying localities; for it

may safely be asserted that a schedule to be correct must recognize each of the following principles:

First. Standards of construction and standards of environment or condition as to fire departments, water-works, topography, etc.

Second. Fire Departments and extinguishing appliances must receive three-fold treatment and be divided so as to apply

a. For the minimum credit, to all risks benefited as regards conflagration hazard or danger from sweeping fires.

b. For the maximum credit, for full protection, only to those risks entitled to it by reason of proximity to hydrant service, fire-engine houses, size of street mains, accessibility of streets, etc.

c. To buildings separately from stocks.

Third. Exposures must receive separate treatment as to buildings and stocks.

Fourth. Stock rates must differ from building rates according to construction and fire department.

It may be well to touch briefly upon the various points of the Schedule.

First.—A Standard City was conceived and described. It involved level and wide streets, gravity water works, adequate pipe service and other features fully explained.

Second.—A Standard Building was described, which may be regarded as a model of ordinary construction, not fireproof.

Third.—A key-rate.

BASIS RATE.

The Basis Rate or starting point for rating a standard building in a standard city was fixed at 25 cents, after careful consideration of the experience tables of the Companies. It surely was not a difficult task to fix this rate for the simplest form of risk under the best conditions as a starting point. It has been criticised as being an arbitrary figure. Even if it had been, it would not differ in this respect from other standards of measure, the units of which were fixed in a much more arbitrary way. For example, it is well known that the English yard was the length of the arm of King Henry I. An inch was three barley corns. The letters of the alphabet and the nine digits or numerals

were arbitrary. Even if this 25 cents had been a guess, it should not be overlooked that it is better to have a guess of an inch than of a mile, and that, under the present systems of rating, guesses are made as to the entire rates of buildings often without examining or inspecting them.

KEY RATE OF CITY.

From this starting point or basis rate of 25 cents, and to obtain the Key Rate of any city, or that figure at which a Standard Building in the city should be rated, additions were made according to the deficiencies of the city as to Water Works, Fire Department, Building Laws, inaccessible or narrow streets, etc., etc. This Key Rate, so determined, is thereafter used to obtain the rate of any building in the city to be rated by adding to it charges for its deficiencies from the specification of a Standard Building. The thickness of walls, the quality of bricks and mortar, character of roofs and floors, and especially of floor openings, area, height, skylights, heating, lighting, &c., have been carefully charged for according to their relative importance, in determining which, the charges for the various features of buildings, construction, etc., were graded according to their tendency to contribute to the destruction of the building by fire, and it will be observed that the charges for such features as open elevators, staircases, well-holes, air shafts, skylights, etc., bear about the same proportionate relation to the total rate that the features themselves bear to the integrity or strength of the structure.

Certain features, also—area and height—were measured with reference to each other when in combination, for the reason that when combined they have a cumulative effect of increasing the danger of total destruction. The charge for area, for instance, is greater in a high building than in a low one.

THE BUILDING STANDARD EDUCATIONAL.

It will be observed, however, that the working schedule does not charge for all variations from the standard, which is ideal and educational; being designed to be handed to a builder or owner contemplating the erection of a building, as an explanation of safe construction. Some of the specifications, for example, cannot be examined or tested afterwards, such as the filling in of hollow partitions at

each floor, but the recommendation may, nevertheless, secure them at the hands of a conscientious owner.

DEDUCTIONS FOR EXCEPTIONAL FEATURES.

To avoid the labor of applying a severe detailed schedule to the thousands of average risks, the great majority of buildings being of ordinary construction, exceptional features such as are rarely met with, are provided for in the Universal Schedule by a system of deductions. This scheme practically makes the Schedule a short one for ordinary risks, since one familiar with it is enabled to pass over whole paragraphs of features which he knows are not to be found in the building to be rated or, for that matter, it may be, in the entire town, on the same principle that one using a two-foot rule would not open it out full length to measure two inches. The Schedule treats by deductions such exceptional features as metallic lathing, water proof floors, fire proof grade floors, extra parapet walls, extra thickness of floor beams, self-releasing floor-joist, etc., etc., and it has the further advantage of providing for those improvements which we may well expect may be developed year by year, and which can thus be recognized without necessitating a rearrangement of the entire schedule, as would be the case if it were framed upon a plan which required a charge for each variation of an exceptional and infrequent character from a high standard. Spare numbers have been left at various points of the schedule for such new features. There is a further decided advantage, also, in a system of deductions foı unusual features over any system of charges in the fact that if overlooked by the rating expert—and even careful experts are liable to overlook exceptional features—the Company will not lose by the full amount of the charge, as it inevitably would under a treatment of infrequent features by charges. It may safely be assumed that the property owner will remind the rating expert of any feature of his risk which would entitle him to a deduction.

FIRE DEPARTMENTS AND EXTINGUISHING APPLIANCES.

These were treated separately for stocks and for buildings by a system of deductions, it being obvious that they should have separate treatment, inasmuch as the

value and efficacy of water-throwing facilities differ as to stocks and buildings. Moreover, certain features of construction, such as self-releasing floor beams, skids for raising stocks above water on floors, tarpaulin covers, &c., &c., which belong exclusively to either the stock or the building, but not to both, are and should be separatelv treated.

Fire departments under the Universal Schedule, receive three-fold treatment. All other systems of rating give them single treatment, rating all risks in a city as if they shared equally in the benefit of a fire department, whereas acres of buildings and stocks may be on the lines of small and insufficient water pipes and remote from engine service and therefore inadequately rated. In an important city it was recently discovered that millions of dollars worth of property was dependent upon a 4-inch water pipe and when an 8-inch pipe was laid the Underwriters breathed more freely, until they discovered, some months afterward, that the hydrants were still connected with the old 4-inch pipe! The Universal Schedule gives all risks in a city the credit of fire departments to the minimum extent, only in the Key Rate. It is of course an advantage to a risk that the city in which it is located should have a fire department and water works even though the building may be two miles from a water pipe or fire engine house, since if a fire should start two and a half miles away it might be prevented from spreading to the risk. Only to this minimum extent, however, in the Key Rate should it get the credit for a fire department. There are, to-day, acres of buildings and millions of values on which the companies are losing money in low rates which would be corrected by the Schedule.

Second.—A fire department for the maximum benefit is brought home to each risk by deductions for proximity to hydrants.

The importance of not allowing credit for a full city fire department except for hydrant proximity and proper mains was illustrated by the burning of a risk worth several hundred thousand dollars, in a suburb of New York, the rate of which had been based on the assumption that fifty steamers and two water towers could be commanded. After the fire, underwriters were mortified to discover that steamers could not get to the risk owing to its inaccessible location. They were comforted to learn later, however, that

even if the steamers had gotten there, they would have found neither water mains nor hydrants, so that nothing was actually lost by reason of the inaccessibility of the street!

Under present systems of rating, risks on the line of ample water mains are paying for risks without water mains, or on the line of 4-inch mains, which is unjust. Aside from the injustice of the matter to property owners, no company can afford to belong to a board which does not make proper discrimination unless all other companies are in the board and honest.

THIRD.—Fire departments are treated separately as to buildings and stocks, a clear necessity if correct results are to be secured, for the benefits of water throwing differ as to both.

EXPOSURES.

In all other systems of rating, the method of arriving at a stock rate is to build up a building rate, including the addition for exposure, when to the final rate so obtained, some fixed sum is added (usually ten cents)—no matter what the fire department and no matter what the character of the building—to get the stock rate. This has the effect of making the same charge for exposure to both building and contents. The exposure charge should not, in all cases, be the same for building and stock. The construction of a building may be of so substantial a character as to effectually protect its contents from any outside fire although itself liable to a paint or glass damage. Under such circumstances to charge anything to the stock for exposure would be unjust to the stock and result possibly in the loss of the risk at the hands of some more intelligent competitor.

CO-INSURANCE ON NON-FIREPROOF BUILDINGS.

No Schedule should be framed upon a basis which does not recognize a certain named percentage of insurance to value. To fix rates without reference to the amount of insurance carried would be not less foolish than to sell dry goods without yard-sticks, or to sell silks and satins at the same price per yard as calico. It

requires no argument that rates are based upon the bricks and mortar of a building as well as upon the wooden trim, and that if the insurance be for only ten or fifteen per cent. of the value of both, the Company would be insuring the wooden trim at a rate based upon considerations of bricks and mortar.

The Universal Schedule, however, does not enforce or require any particular amount of insurance, but simply adjusts itself, by the rule on page 52, to whatever amount the property owner elects to carry. There is no compulsion. If the insurance is 50 per cent. of value no deduction is allowed. If the amount of insurance carried exceeds this percentage, a deduction of one-half per cent. of the rate for each one per cent. of insurance in excess of 50 per cent. of insurance to value is allowed. If less than 50 per cent. of insurance to value is carried, 1 per cent. of the rate is added for each per cent. less than 50 per cent. It will be conceded that there are few buildings—and probably no stocks—insured for less than 50 per cent., and that, therefore, this percentage will cover all practical cases, and reduce to a minimum the number of risks that need inquiry.

The propriety of not insisting upon co-insurance but of grading the charge according to the amount carried will be demonstrated by the friction saved. The average man declines to be coerced; he rebels against being dictated to as to quantity as well as price, claiming, with much reason, that he has the right to buy as much or as little of the article purchased as he chooses. The Universal Schedule meets him upon this basis, and the underwriter is enabled to say to him: "We do not care how much or how little of our commodity you desire—you decide that for yourself—our prices, of course, are fixed, like your own, lower rates being made for wholesale quantities than for retail purchases."

The reason for the scale of reduced rate is based on the following fact: The experience of companies, as to the distribution of losses according to percentage of value in fire department cities, is about as follows:

68 per cent. of the losses in number are under $100 in amount; 15 per cent. are over $100 and under 25 per cent.

of the value of the property; 7 per cent. in number are between 25 per cent. and 50 per cent.; 5 per cent. between 50 per cent. and 80 per cent., and 5 per cent. total. These percentages, while "round figures," are close to the exact percentages.

Let us assume 10,000 risks of $1,000 value each, carrying $500 insurance each (or 50 per cent of value), at a rate of 1 per cent., yielding a total premium of $50,000 and a loss experience of 200 losses amounting to $27,500, or 55 per cent. of the premiums. About 68 per cent. of the 200 losses, or say 136 in number, would be under $100; about 15 per cent. of the 200 losses, or 30 in number, would be over $100 and under 25 per cent.; about 7 per cent., or 14 in number, would be from 25 per cent. to 50 per cent.; about 5 per cent., or 10 in number, would be from 50 per cent. to 80 per cent.; and about 5 per cent., or 10 in number, would be total.

The following table would show the distribution of losses and premiums: The column headed "Value Loss" would show the estimated amount of loss or damage to the property based upon the tabulated Company experience.

No. of Risks.	No. of Losses.	Per Cent of Loss to Value.	Value Loss.	Ins. Loss with 50 % Ins.	Ins. Loss with 70 % Ins.	Ins. Loss with 80 % Ins.	Ins. Loss with 100 % Ins.
10,000	136	under $100	$3,500	$3,500	$3,500	$3,500	$3,500
"	30	$100 to 25 %	7,000	7,000	7,000	7,000	7,000
"	14	25 % to 50 %	7,000	7,000	7,000	7,000	7,000
"	10	50 % to 80 %	7,500	5,000	7,000	7,500	7,500
"	10	Total or 100 %	10,000	5,000	7,000	8,000	10,000
10,000	200		$35,000	$27,500	$31,500	$33,000	$35,000
		Rate........		1 %	90 cts.	85 cts.	75 cts.
				a	*b*	*c*	*d*
Am't of Premiums (10,000 Risks),				$50,000	$63,000	$68,000	$75,000

a. 10,000 risks insured for 50 per cent. of value, or $500 each, at 1 per cent., would yield $50,000 premiums. On this amount of premium the insurance loss ($27,500) would be just 55 %.

b. 10,000 risks insured for 70 per cent. of value, or $700 each, at 90 cents (100 minus 10 per cent., being a reduction in rate of ½ per cent. for each 1 per cent of insurance in excess of 50 per cent., *i. e.*, 20 per cent.), would yield a premium of $63,000. On this amount of premium the insurance loss ($31,500) would be just 50 %.

c. 10,000 risks insured for 80 per cent. of value, or $800 each, at 85 cents (100 minus 15, being ½ per cent. reduction for each 1 per cent. of the 30 per cent., which 80 per cent. insurance is in excess of 50 per cent.), would yield $68,000 premium. On this amount of premium the losses ($33,000) would be safely within 50 %.

d. 10,000 risks insured for 100 per cent. of value, or $1000 each, at 75 cents (being, a reduction of 25 per cent. or ½ of 1 per cent. for each 1 per cent. of the 50 per cent. which 100 per cent. exceeds 50 per cent.), would yield $75,000 of premiums.

This computation, on an actual experience of the distribution of partial and total losses, shows that the rule

of deducting ½ per cent. for each 1 per cent. of co-insurance in excess of 50 per cent. would be a safe one, the amount of premium resulting being adjusted at a safe multiple of the amount of loss at each point, or percentage of insurance carried (see *a*, *b*, *c*, *d*, in preceding table).

It will be apparent that co-insurance or contribution is of no value whatever, on total losses, and of little value on those under $100 in amount. These two classes form 78 per cent. of the entire number of losses. It is practically on the remaining one-fourth (losses between $100 and total) that co-insurance is a benefit, and from this benefit or salvage on partial losses, must be deducted the increased insurance loss on the total losses to get the net benefit of co-insurance in connection with the increased premium. The computation also demonstrates that the value of contribution is measured by the percentage of rate proposed, since it will clearly make no difference in the percentage of loss to premium of the company whether it has all of the insurance or whether a portion in excess of its line is carried by other companies. If, for example, it has one-half of the insurance it will have half of the premium and incur one-half the loss.

The computation also shows that the assumptions frequently made that a 1 per cent. deduction in rate can be allowed for each 1 per cent. of co-insurance in excess of the percentage of value on which a rate is based are incorrect. Those who have advocated such concessions for co-insurance have overlooked the facts developed in the above distribution of losses. For example, if from rates based upon an insurance of 50 per cent. of value a deduction of 50 per cent. should be made for full insurance, the premium on a thousand risks would be only $50,000, whereas the losses, as shown in the table, would be $35,000, and the percentage of loss to premium would have increased from 55 per cent., in the first example given, to 70 per cent. This shows that the deduction of ½ of 1 per cent. in the rule, is much nearer the correct figure than a deduction of 1 per cent. for each 1 per cent. of co-insurance which would result in loss with full insurance. While full insurance is an advantage in partial losses, it increases the insurance loss on all losses which are total, the insurance loss being increased in direct proportion as the insurance approaches the value.

CO-INSURANCE ON FIREPROOF BUILDINGS.
HOW TABLE WAS COMPUTED.

Clearly, in no class of buildings is a knowledge of the amount of insurance carried more necessary for determining rates and lines than in the case of fireproof buildings. A small percentage of their value, say 15%, would cover the wooden trim, window and door frames, dados, floor boards, paint and fresco work, plate glass, which is as destructible as a non-fireproof building; and if a fireproof building be insured for only 15% of its value, the rate should approximate that of ordinary wood and brick construction. This small percentage of 15%, therefore, was assumed to be one extreme, and the full value, 100%, the other extreme.

A building, supposedly worth a million of dollars, was taken with estimates of rate for each $100,000 insurance carried. The assumed rate for the minimum of insurance was 100 cents, or 1%, and, that being so, the premium for $150,000, or 15% of value, would be $1,500. If $200,000 should be carried, the additional $50,000 could be taken at much less than the rate for $150,000. Clearly, an underwriter having already $200,000 on a fireproof building, offered an additional $100,000, would have presented to him, in fixing the rate, practically the same consideration which determines the rate in the case of what is known as "excess" insurance. He would be already liable for all partial losses, and his extra $100,000 could not be called upon until his $200,000 had been exhausted. In this view he could afford to write the extra $100,000 at a materially lower rate than his $200,000. The schedule table fixes the rate for this $100,000 at 40% of the rate for the $200,000. In like manner each subsequent $100,000 would be in the nature of excess insurance and be written at a 5% less percentage of the rate than that of the preceding $100,000.

For example, if $400,000 should be carried, the extra $100,000 could be taken at 35% of the rate for $300,000; if $500,000, the extra $100,000 would be at 30% of the rate for $400,000; if $600,000, the extra $100,000 would be taken at 25% of the rate for $500,000, and so the last $100,000, making the $1,000,000, could be taken at 5% of the rate for $900,000. The following table will illustrate more clearly:

Percentage Insured.	Percentage of Preceding Rate Charged for Next $100,000 of Insurance.	Amount Insured.	Rate.	Premium.
15%	100%	$150,000	100 cents	$1,500
20%	45%	200,000	86.3 "	1,725
30%	40%	300,000	69 "	2,070
40%	35%	400,000	57.8 "	2,312
50%	30%	500,000	49.7 "	2,485
60%	25%	600,000	43.5 "	2,610
70%	20%	700,000	38.5 "	2,695
75%	17.5%	750,000	36.4 "	2,732
80%	15%	800,000	34.4 "	2,710
90%	10%	900,000	30.9 "	2,785
100%	5%	1,000,000	28 "	2,800

The figures of the fourth column, based as they are upon 100 cents per $100, upon a value of $1,000,000 and upon successive ten per centums of such value, will be percentages to be taken of any rate for the corresponding percentage of co-insurance.

For example, if the rate of a particular building worth $1,000,000 should be 25 cents, and $300,000 should be insured, 69% of 25 cents, or 17¼ cents, would be the rate with a 30% co-insurance clause. If the rate should be 30 cents and the amount of insurance $400,000, 57.8% of 30 cents, or 17.34 cents, would be the rate with a 40% co-insurance clause in the policy.

There has been computed a table (which see) which gives the figure for any per cent. of co-insurance of any rate.

As already stated, however, the rates are promulgated at 80% co-insurance.

It will be seen from an examination of the second column of the table that the decreasing series is 45%, 40%, 35%, 30%, 25%, etc., to the minimum of 5% for the maximum of full insurance. The rates were computed for each amount of insurance in the following manner: $150,000 at 1% would yield $1,500 premium; $200,000 would yield $1,725 (the extra $50,000 at 45% of 100 cents, the rate for $150,000, or 45 cents, would yield $225 premium, which added to $1,500 for the first 150,000 would make $1,725.) Dividing this by 200,000, the average rate is seen to be 86.3. The rate for $300,000 would be computed by adding to the premium for the $200,000 ($1,725) 40% of the rate (86.3) for $200,000, yielding 34.5 cents for the extra $100,000, or $345, making $2,070 for the $300,000—an average rate of

69 cents. Clearly, as already stated, therefore, the rates thus obtained for each $100,000 or each 10 per cent. of insurance carried (the value of the building being a million dollars and the starting rate 100 cents) would be figures which could be used as percentages of the actual rate of any building.

EXCLUDING FOUNDATIONS.—The practice has been growing of late to exclude foundations of fireproof buildings from the protection of the policy and from the operation of the co-insurance clause, by some such clause as follows, for example:

"*This policy does not cover, attach or apply to the foundations or any portion of the building below the street grade line, and the value of such portion of the structure is excluded, also, from the operation of the co-insurance clause.*"

Where this practice obtains it must be borne in mind that the table of rates for co-insurance in the schedule having been calculated for the full co-insurance, including the foundations, the same rate must be taken as would be required for the amount of insurance actually carried *as compared with the full value* of the building, including foundations.

For example, if it is estimated, in the case of a building worth $500,000, that the foundations and the portion below the street grade are worth $100,000, and that the value of the building for purposes of insurance and the operation of the co-insurance clause is fixed at $400,000, an owner, with a 75% co-insurance clause in his policy, would be required to carry only $300,000; the rate in such case, however, should be that fixed in the table for 60% co-insurance—$300,000 being 60% of $500,000, the actual value of the building, including foundations. In the example taken, therefore, if the rate of the building without the co-insurance clause be 65 cents the rate with a 75% co-insurance clause should not be 23.66 but 28.27, the rate named in the table for 60%

It may be well to suggest in this connection that it is not to the interest of a property owner to exclude foundations or the more solid portions of the building below the street grade. Under the operation of the universal

schedule system of charging for co insurance the rate for this portion of the building is exceedingly low, and it costs but little more (as in the case above cited) to insure these portions. The table is equitable, and the charge for insuring these safer portions of the structure will be found low enough to measure fairly and equitably their average exemption from damage. It sometimes happens, however, that the damage to the foundations of a building, owing to fires in stored combustible material, fuel, old furniture, etc., etc., is serious, especially where granite blocks are employed instead of bricks; and taking everything into account, it will be found that the property owner would more wisely pay the small charge exacted, than run the risk of a serious loss for so small a premium. To carry his own foundations himself when he can so cheaply have it done by an insurance company is, in fact, gambling at heavy odds.

STOCKS AS COMPARED WITH BUILDINGS.

An important feature of the Universal Schedule is the treatment of stocks as compared with buildings, and this, in view of the astounding inconsistencies of rating throughout the country, may well be considered the most important of all. The Committee find there are, at present, four ways of rating stocks throughout the United States. One is to add to the final building rate, including the charge for exposure, a fixed sum of thirty cents—no matter what the character of the building and no matter what the character of the fire department—to get the stock rate. A second plan is to add 20 cents, a third to add 10 cents and a fourth to add nothing, the stock rate being, in some cases, the same as the building rate, while in others it is actually less, even in fire department towns. In two instances coming to the attention of the Committee, stocks of cutlery were rated lower than good, brick, metal-roofed buildings containing them, and this in fire department towns! It is unnecessary to suggest that, with such rates, companies held by membership in tariff organizations are not likely to get the buildings while there are any companies not in the Board who know the difference between buildings and stocks.

Such unequal and inconsistent rating as this puts a premium on remaining out of local boards and commission

agreements, and accounts for the competition of companies who decline to be tied where so much is to be made by discrimination. If the Universal Schedule should never be adopted as an entirety, it could not fail, in correcting ratings of this character, to be worth to the insurance fraternity all and more than it has cost in the labor and time expended upon it.

Any underwriter who understands his business knows that, as a rule, bricks and mortar are better for insurance than cutlery, dry goods, millinery or groceries, especially if there be a fire department. The degree of difference depending upon the character of the building and the efficiency of the fire department. Where these are of the best, the building should be materially lower than the stock, even to the extent of being in some cases possibly one-third the stock rate. A damage of a few thousand dollars to a strong building would involve three times the amount of damage to a stock of merchandise from water alone.

In a fire department town, a building whose floor-joist and story posts are 12 inches square, with 3-inch plank flooring, &c., or constructed in accordance with the Schedule standard, has the probabilities largely in its favor of a fire being extinguished with a damage to the building of not one-fourth the amount which would be lost on the stock. It should be remembered that the only advantage afforded to a stock by a building of the best construction is the advantage of protecting it from an outside fire, or of preventing a fire from spreading from one floor to another. Even a fire-proof building is of no other advantage than this to its stock, which may be effectually consumed within its fire-proof walls like the contents of a stove. A stove is fire-proof but its contents are not. Indeed, fire-proof buildings, with airshafts, elevators, stairways, etc., to insure drafts from cellar to roof, may act like stoves, for the effectual cremation of their contents. The advantages of construction to stocks are overestimated.

Clearly, therefore, the better the fire department and building the greater should be the difference between the building and stock rate and *vice versa.*

METHOD OF RATING STOCKS.

The Universal Schedule obtains the unoccupied building rate (item No. 127) by charging for each variation of the city in fire department and water supply from standard and for each fault of construction of the building so that the deficiencies of the building, viz.: The excess of its rate (item 127) over that of a Standard building in a Standard city (25 cents) indicates clearly whether a smaller or larger sum should be added to the building rate to get the stock rate. It will be found that the rule of the Schedule requiring that 25 per cent. of the deficiencies of the building be deducted before making the addition for the stock rate, will adjust the rate properly to conditions of construction and fire department. This rule will be uniform and automatic. The adjustment of the matter should not be left to the varying judgments of rating experts.

For example, the addition for retail dry goods to a Standard building being 50 cents, 25 per cent. of the deficiencies of a building not Standard deducted from 50 cents would give the amount to be added for the stock so that while, if the building be Standard (25 cents) the rate on dry goods should be 75 cents, but if the building rate should be 41 cents (16 cents worse) 25% of 16 cents, or 4 cents, should be deducted from 50 cents, leaving 46 cents to be added to the rate of the building (41 cents) making 87 cents for the stock rate. If the rate of the building be 185 (a poor building) 25% of its deficiencies (160) or 40 cents should be deducted from the dry goods rate, leaving 10 cents to be added to 185 making the rate on stock 195.

All stocks are arranged in a table of two columns. The first column contains the measure, in cents, of those features of a stock which cause fires, and when once started, bad or intense fires—liable to destroy both building and contents. The second column contains that feature of the stock which may be termed its susceptibility to damage by water, smoke, etc.

All stocks, for insurance purposes, should be regarded from these three standpoints. Those, which like wholesale drugs, stocks of furniture, oils, etc., are liable to cause fires and to furnish fuel for intense combustion, should increase the rate of any building into which they enter, and also the rate of all other stocks under the same roof. The susceptibility to damage feature, however, is not one which makes

the building worse. A stock of cutlery, for example, is peculiarily liable to damage by water or smoke, and this fact should be taken into account in fixing the rate upon it, but it does not add anything to the hazard of the building containing it.

In the second column of the table, is the sum to be added to the rate of a Standard building in a Standard city (25 cents) to get the rate of a stock in such building. For example, stock No. 811, retail dry goods, would be rated at 75 cents (25 + 50) in a Standard building in a Standard city. A stock of wholesale drugs in the same building would rate at 210 (25 plus 185). At this point both building and stock would be entitled to the deductions for hydrant proximity, water pails, &c., provided for Nos. 155, 190, etc.

The following example will more fully explain the plan upon which the Schedule is framed :

Let us suppose a building contains an apothecary stock, No. 423, which adds 10 cents to the building ; a cabinetware stock, No. 604, which adds 50 cents to the building ; a stock of artists' materials, No. 435, which adds 10 cents to the building, and a wholesale drug stock, No. 806, which adds 100 cents to the building ; the building and respective stocks would be rated as follows :

Having ascertained the key-rate of the city in which the building is located and having found that the unoccupied rate of the building itself based upon it (No. 127, page 38) is, let us say 85 cents, the occupied building rate would be 85 plus 100, equals 185—the highest rate, or that of the most hazardous stock in the building, wholesale drugs (100 cents) being taken as the addition to the building.

To get the rate of the wholesale drug stock, there should be added to the occupied bdg. rate, No. 128, its figure in the second column of the table, 85, first deducting 25 per cent. of the deficiencies of the building from Standard. Inasmuch as the building rate is 85 cents, the excess of this figure (60 cents) over that of a Standard building in a Standard city, (25 cents), would be its deficiencies, 25 per cent. of which, or 15 cents, should be deducted for each stock in the building. The rate on wholesale drugs, therefore, would be 185, minus 15, plus 85, equals 255.

The rate on the Apothecary Stock would be as follows : 185, minus 15, plus 50, equals 220.

The rate on the stock of Artists' Materials would be as

follows: 185, minus 15, plus 75 (the rate named in the second column of the table), equals 245.

The rate on the stock of Cabinetware would be as follows: 185, minus 15, plus 75 (the amount named in the second column of the table), equals 245.

The rate on a stock of Retail Dry Goods would be as follows: 185, minus 15, plus 50, equals 220.

The summing up of the foregoing ratings would be as follows:

128.	Building rate occupied	85 + 100,	= 185.
423.	Retail Drugs	185 — 15 + 50,	= 220.
435.	Artists' Materials..	185 — 15 + 75,	= 245.
604.	Cabinetware......	185 — 15 + 75,	= 245.
806.	Wholesale Drugs..	185 — 15 + 85,	= 255.
811.	Retail Dry Goods.	185 — 15 + 50,	= 220.

By adding the first column charge of the most hazardous stock in the building (in this case, Wholesale Drugs), all the first column charges of other less hazardous stocks are thus included and provided for.

There could be no plainer illustration of the propriety of this method of ascertaining the rates of various stocks in the same building, than in the case of Retail Drugs and Wholesale Drugs. Clearly those features of a retail drug stock which make the building worse to the extent of 10 cents, are all to be found in wholesale drugs, and, therefore, contained in the 100 cents which measure these two features in the wholesale drug rate. The 10 cents being already contained, therefore, in the 100 cents named in the first column for wholesale drugs, does not need to be added to bring the retail drugs up to the hazard of wholesale drugs.

Especially in the case of buildings containing a number of tenants, and in order to save the deduction of one-fourth of the deficiencies of building, for each stock at rate, No. 127, and of adding the excess of any more hazardous stock in the building, the rate No. 128 (that for the building occupied) is taken, instead of No. 127. No. 128, as already explained, includes not only the first column charge of the stock to be rated, but also the excess of any more hazardous stock, because it contains the first column charge of the most hazardous stock. By deducting one-fourth of the deficiencies of the building at this point, a base or key-rate is obtained for all contents to which it is only necessary to

add the susceptibility to damage or second column charge of any stock to get the rate of such stock, which will then be subject, of course, to the Fire Department deductions, Nos. 190, 191, &c., and for co-insurance.

In the Table, it should be remembered, the second column charge *contains only the susceptibility to damage feature.*

To recapitulate, let us suppose a building whose rate at No. 127 is 85 cents, under the U. M. S. The charges in the Table would be for

Wholesale Drugs,	100	85
Retail Dry Goods,	0	50
Millinery,	0	75
Baskets,	15	60

The rate of the building occupied at No. 128 is taken, viz., 185 ; from this would be deducted one-fourth of the deficiencies (15 cts.), giving 170, which would be the base or key-rate for all stocks in the building, to which it would only be necessary to add the second column figure of the table—85 cents for wholesale drugs, 50 cts. for dry goods, 75 cts. for millinery, 60 cts. for baskets—thus saving a repetition in each case of the deduction for deficiencies, and also the excess hazard above the first column charge of the most hazardous stock—an important saving of time in a building of omnibus occupancy.

In some of the systems of rating now prevailing throughout the country, all stocks under the same roof are made to rate as high as the worst stock in the building and, in the example above cited, all rates would be brought to the wholesale drug rate (255). This clearly would not be right. The mere susceptibility to damage feature of wholesale drugs is one which ought not, in any way, to increase the rate of any other stock in the building, and to add any part of the 85 cents of the wholesale drug rate which measures this feature, in addition to the 100 cents in the first column of the table, which measures the liability to cause fires and those of destructive character, would be radically wrong. It is only these two latter features which should be taken into account in rating any other stock in the building. Ninety-five per cent. of the losses in a fire department city are partial. In case of a fire in a standard building, in a standard city, the various kinds of contents would be found to show a salvage, it is believed, in the ratio

of their respective second column figures in the table: and the salvage on the building would be in the ratio of the building rate to the respective stock rates.

ADVANTAGES OF RATING BY SCHEDULE.

It would be a mistake to assume that the only advantage of rating by schedule is that of accurate measurement of conditions, resulting in rates which would be adequate or profitable to the Insurance company and, at the same time, equitable or just to the property owner.

If a system of rating would tend to prevent fires from starting and limit their dimensions by preventing their spread, it would, by the reduction of loss, yield a not less certain profit to the Company than would an increase of premium, while it would, at the same time, reduce the ultimate cost of insurance to the property owner and lessen the fire waste of the country. In fact, a reduction of one dollar in the loss account is of more importance than an increase of two dollars in premium. The one is all of it net profit; the other a gross income, which includes a certain expense and a possible loss.

PREVENTABLE FIRES.

A system of rating which places a penalty upon defects of construction and faults of management such as the accumulation of rubbish in cellars, garrets, rear yards and alleys, swinging gas brackets, sawdust on floors, ashes in wooden boxes and barrels, open lights in show windows, etc., etc., would tend directly to reduce the fire loss. Such faults will never be corrected by preaching sermons.

They should be charged for and followed up by inspection at whatever cost. IT IS BETTER TO PAY FOR MAN'S WORK THAN FOR FIRE'S WORK.

It was the accumulation of rubbish in a rear yard which led to the destruction of the City of Fargo, Dakota, and if the owner of the premises had been charged a higher rate of insurance for such fault it may safely be assumed that the destruction of that city would have been prevented.

In an ordinary city of twenty millions of mercantile values (and this would be a large estimate for many cities of the country) a single fire costing a hundred thousand dollars means a 50 per cent. loss ratio on an average rate of 1 per cent., which, even with full insurance, would yield

an annual premium of only $200,000. One additional fire of this size would mean a one hundred per cent. loss ratio, leaving nothing for expenses or profit.

PREVENTING CONFLAGRATIONS.

A discriminating schedule which recognizes faults of construction would improve the buildings of the country to an extent which would materially reduce the number of fires which, under present conditions, extend beyond the buildings in which they start, despite the efforts of Fire Departments to control them. If one-half the conflagration losses of the past could have been saved—and proper construction of an inexpensive character would have saved this proportion of them—the Companies in this one direction alone would have realized a fair profit. There could be no better illustration of this fact than in the difference between the cost to a single Company of the great Boston fire of November, 1872, as compared with that of November, 1889. In the latter fire the loss of the company was $40,000, whereas in the former it was over $800,000. And it may safely be said that the difference in destruction was due to the one fact that in the pathway of the '89 fire was a building of superior construction, which enabled the Fire Department to control the conflagration.

Twenty per cent. (20%) of the losses of Companies, year by year, on mercantile risks are from exposures; one-half of this saved would equal 5 per cent. profit on the premiums.

BUILDING LAWS.

A system of schedule rating which charges and collects from both owner and tenant, a yearly penalty in the shape of a rate-charge for faults of construction, occupancy and management, would prove more efficient for the enforcement of building laws than the laws themselves, which often, through the influence of builders and architects, are deprived, before enactment, of all penalty provisions and, even in the case of important cities, are simply mandatory. To conduct the business of fire insurance on a basis which does not penalize bad construction is to conduct it on lines which make it dangerous to society. If property owners, architects and builders are led to ignore obviously correct systems of construction, because of the fact that they can secure insurance as cheaply as if they

build more correctly, the natural outcome will be that entire cities will be subjected to the dangers of sweeping conflagrations. Whatever may be the rights of an individual as to the construction of a building owned by him in the center of a ten-acre lot, there can be no question that every man should be required, in the compact portions of cities, where the burning of his own structure may endanger that of his neighbor, to build in accordance with well-known laws as to the prevention and control of fires Indeed, no building should be permitted in the compact portion of a city which would not effectually and safely cremate its own contents without injury to its neighbor.

CONFINING FIRES TO FLOORS.

If buildings should be constructed in accordance with the standard described in the Universal Mercantile Schedule, or even on a plan approaching this standard, as to floors, enclosed stairways and elevators, etc., fires, in the majority of cases, would be confined to the floors on which they start. It may safely be assumed that one-tenth of the losses which would be saved in this way if fires could be confined to single floors would yield a handsome profit to the Companies.

These three lines of thought in the direction of securing a reduced loss ratio throughout the country, reveal possibilities which dwarf considerations of improved premium accounts; for it may safely be claimed that if the Universal Schedule did not raise rates in any section it would increase the profits of the Companies without imposing additional burdens upon the assured.

IMPROVED FIRE RECORD.

REDUCED RATES FOR REDUCED LOSSES.

It may be asked, at this point, what action should be taken in case this forecast of the future should prove the true one and it should be found that losses would be reduced. A far-seeing underwriter has suggested that it would clearly be wise to recognize it by a percentage reduction of the premiums of succeeding years so soon as say two years of successive low loss ratio have warranted a belief in an improvement in city conditions. This would practically place the whole matter on a three-year basis, because two years would have been assured without reduction and the first reduction would be on the third year.

According to the methods of the past rates, following a reduced loss ratio, have usually broken in demoralized competition and have been cut in two below the middle. Would it not be a more intelligent method of treating such improved conditions to forestall demoralization, make a virtue out of a necessity and voluntarily give a reduction in rate of 1 per cent. for each 1 per cent. that the loss ratio goes below 55 per cent., and so impress property owners with our fairness and, at the same time, with the fact that they are directly interested in preventing fires and in controlling them?

We should then have a new factor in the business of insurance, altogether wanting under existing methods—co-operation on the part of citizens to prevent fires, to improve fire departments and water supply and to punish fraud and incendiarism. Twelve intelligent citizens in a jury box would not then ignore convincing proof of intentional burning and fraud upon Insurance Companies.

That the companies could afford such a reduction will be seen from the following computation:

Let us suppose an average rate of 1 per cent. and a loss ratio reduced to 40 per cent. instead of 55 per cent. A reduction in rate of 15 per cent. (or 1 per cent. for each 1 per cent. of reduction of loss ratio below 55 per cent.) would mean an 85-cent rate, in place of 100 cents; but the 40 cents of loss would be 55 per cent. of a 72-cent rate, so that the Company would still have a margin of 13 cents, with its policy-holders satisfied. This margin would provide safely for the element of any simple good luck in the experience of a city.

In case the record of the city should change for the worse in a subsequent year, property owners could easily be convinced that the Companies could no longer afford to allow the deduction, and the majority of them would address themselves to the task of improving the record of the city in their own interest, instead of spending their time, as they do now, in denouncing Insurance Companies as "trusts" and in securing adverse legislation.

Under this system, moreover, how easy would it be to answer the objections invariably raised to any increase in rates on the ground that they are not needed. It would be possible for the underwriter to say: "If you are right and we are wrong, and results show that the loss ratio of

this city is less than 55 per cent. of the premiums, you will get 1 per cent. reduction for each 1 per cent. that it is less, and will have a practical readjustment of rates on your own proposition."

For the first time in the history of the business the percentage of loss to premium would become significant and important. At present it is simply interesting. An average loss ratio of 50 per cent., for example, may conceal the fact that many of the classes are costing the Companies 100 per cent. of the premiums, while others, with low loss ratios, are helping to pay for them and to reduce the average percentage. Under a system of uniform schedule rating, however, an improvement in the percentage of loss to premium would indicate that all policy-holders—those having poor risks as well as those having good ones—were entitled to a pro-rata reduction in rate, since the owners of bad risks could claim that they had contributed pro-rata to the premium account in rates based upon merit and demerit, and so had paid for the faults of their risks.

Inasmuch as the Schedule recognizes the previous fire record in computing the key-rate of the city, it is eminently proper and only fair, that if the record should improve—and it is an observed fact in connection with schedules which penalize faults of construction and management that the loss record does improve—the entire system of rates of the city ought, in justice to property-owners, to be adjusted to the improved condition. Underwriters have heretofore made this adjustment by abandoned tariffs and broken rates, without securing anything whatever in return. The plan outlined would secure in return for the reduction in rate, the hearty and sympathetic co-operation of all property-owners, who would take a proper civic pride in the record of the city.

Does not this view of the matter present the ultimate and successful solution of the difficult problem of rating in the United States?

Is it not true, as a simple abstract proposition, that any rating system, the Universal or any other, must recognize the existing fire record of the territory or city at the time of applying it, and afterward, in case the fire record improves, recognize the improvement? If the regular line tariff Companies do not recognize it, the non-tariff Companies certainly will. Is it, indeed, possible to conceive of any

successful or permanent treatment of insurance rates which, while it takes notice of an unfavorable existing fire record, does not recognize a subsequent improved fire record, and between these two maintain a uniform schedule or measure for fixing rates. With such a scheme of rating it makes little difference, indeed, whether or not the intermediate measure or schedule produces rates which are too high, if only the schedule be uniform and rate all risks alike, for the adjustment can easily be made, year by year, according to the ratio of loss to premium.

Any schedule which raises the rates of a city will be regarded with disfavor by property-owners and, in the majority of cases, by the local Agents as well. With the certainty of reduction on a favorable fire record, however, criticism is disarmed and competition of non-tariff Companies will be less effectual for breaking prices. Not only will such competitors hesitate to cut a rate which is kept uniformly adjusted to a 5 per cent. profit, but intelligent property-owners themselves can be made to see that as their security—the thing they pay for—depends upon adequate rates rather than upon capital, they will be unwise in entrusting their premium money to concerns which claim to be better judges of risks and rates than all other underwriters put together.

UNIFORMITY IN RATING.

If a system of schedule rating had no other merit than that of uniformity, this feature of it would alone be an important argument in its favor. It must certainly be conceded for the Universal Schedule what is claimed for it—that it measures all risks, no matter where located, alike. If, in the opinion of any, it produces rates which are too high, all must be too high; if any are too low, all must be too low. Being a uniform measure of conditions and of prices, it offers, in the line of thought already presented, the easy and effectual solution of the difficult problem of how to meet conditions of reduced loss ratio. By such deduction as has been suggested it can be adjusted to a high fire record, or to a low one.

for a five year period should govern the fixing of the key-rate of a city to cover any possible moral or unknown hazard. To this end the committee provided for an increase of the key-rate of a city by adding to it twenty per cent. of its amount for each one dollar of loss in excess of $5 per $1,000 of insurance, as explained on pages 19 and 20.

The percentage of loss to premium is, of course, a changeable and unreliable quantity, varying with the rate obtained. The amount at risk and the amount of loss per each $1,000 at risk, on the other hand, present reliable bases for determining what the rate of premium should be. For example, in the supposable case stated, of a town with $20,000,000 of mercantile values at risk, and a fire loss per annum of $100,000, it is clear that the annual loss is $5 per $1,000, but while this would be 50 per cent. of the premium at an average rate of 1 per cent. (which would yield a premium of $200,000), it would be 100 per cent. of the premium if the average rate should happen to be 50 cents per $100. A loss of $140,000 per annum in a town of $20,000,000 of values (a good sized town) would be at a rate of $7 per $1,000 at risk, and therefore $2 in excess of normal ($5 per $1,000), but it would be only 50 per cent. of the premium if the average rate should happen to be 140 (which would yield $280,000 premium) and fully 70 per cent. of the premium at a 1 per cent. rate. If the latter should happen to be the average rate prevailing, it is clear it should be raised 40 per cent. to 140 in order to maintain the ratio of loss to premium at 50 per cent. The scale of increase should thus be 20 per cent. for each $1 of loss per $1,000 at risk in excess of $5. See No. 30. If the percentage of loss to premium were regarded as a reliable feature, a town whose insurable values were $20,000,000 and fire losses $140,000 on a premium of $280,000 would be considered normal, the loss being only 50 per cent. of the premium, whereas the lowness of percentage would be simply due to the fact that the average rate obtained was unduly high (140), and not to the fact that the rate of burning was low, the latter being, in fact, so abnormally large ($7 per $1,000) as to make the loss 70 per cent. on a premium rate of 1 per cent., which may be regarded as a fairly full average rate.

The previous five years fire record can be easily deter-

mined by the books of say five of the agents doing the largest mercantile business, by picking out of their registers the amount insured on mercantile buildings and stocks and calculating the amount of loss per $1,000 of insurance. Their business would be a safe sample of the whole.

The addition of 20 per cent. of the "key-rate" for each $1 in excess of $5 per $1,000 is taken and not 20 per cent. of the final rate obtained by the schedule because, from the key-rate forward, the schedule makes proper charges for such faults of construction and management as may, in the past, have caused the abnormal loss record, and to add, therefore, 20 per cent. of the final rate would be to charge twice, which would be unjust.

IT WILL TEND TO PREVENT RATE CUTTING.

No company has a percentage of fire loss to earned premium low enough to justify it in writing five per cent. below the discriminating rate obtained by a proper Schedule, and it could be clearly demonstrated to an intelligent property owner from the Company's own sworn statement to the Insurance Department, that an offer to write 10 or 20 per cent. less was evidence that the Company cutting was either ignorant as to the business or reckless as to consequences. A merchant would soon realize that upon adequate rates, not less than upon substantial capitals and net surpluses, depends his security, and that to accept an inadequate rate from a Company pursuing a cut-throat policy would be as foolish as to deposit money with an unreliable custodian in order to draw interest dividends out of his own principal. An intelligent and accurate Schedule, therefore, based upon combined experience, is calculated to prevent the loss of business by reckless rate-cutting. Unless a system of rating goes thoroughly enough into detail to consider every feature of a risk, however, the rate cutter is given a decided advantage. If the system of rating in any locality be that of short schedules which do not go carefully into details of construction, &c., the best risks must necessarily be brought up to the average rate of the average class, and where such systems prevail there will always be rate cutting. In the case of area, for example, if the Schedule did not make a difference between areas cut off by curtain or cross walls, as compared with open areas, any competing company could intelligently argue to a man having a building so

sub-divided that the system of the Schedule was incorrect to this extent and unjust to his risk. If it should overlook proximity to hydrants or to fire engine houses or other features, the door would be left open for intelligent discrimination in price, and the company getting the risk would deserve it. *Wherever a Local Board rates the choice risks of exceptional construction according to an average standard, the non-board companies will secure them.*

RATING BY DISINTERESTED EXPERTS.

One of the most practical, experienced and successful underwriters of this country, lately suggested the advisability of forming a Stock Company to rate the entire country on the basis of the Universal Schedule, and sell the rates to Insurance Companies, making charges, as do the Mercantile Agencies, for specific rating slips and further detailed information. His argument was that no Company could afford to be without such information, and that agreements to get the rates would practically be a logical and inevitable sequence of the plan : if, indeed, he argued, any agreements would be necessary, in view of the fact that most of the present rate cutting grows out of honest ignorance as to what the faults of risks are and what their rates ought to be.

WILL THE UNIVERSAL SCHEDULE RAISE OR LOWER RATES ?

The question has frequently been asked, will the Universal Schedule have the effect of raising or reducing rates. The only answer that can obviously be made to this is, that if the Schedule is correct and there are any rates which are too low it will raise them ; if there are any which are too high it will reduce them. It is like any other standard of measure. A two-foot rule would increase or decrease offhand estimates of distances according to the accuracy or inaccuracy of estimates. It is simply necessary, therefore, by way of reply, to ask two questions—are there any rates in the country too high or too low, and is the Schedule correct ?

ADVANTAGES TO LOCAL AGENTS.

Under a schedule system of making rates the Agent can explain to a dissatisfied assured the reason for his rate,

in many cases indicating to him how he can, at small expense, reduce his rate by improving his risk. At present, much of the dissatisfaction of property-owners grows out of the fact that no one can explain why they are required to pay more than others in the same line of trade and under conditions which seem to them identical with their own. It is safe to assume that competition will always prevent exorbitant rates, and that, therefore, equitable rates which can be explained and defended are directly in the interest of the local Agents, and will contribute to their comfort as well as to their profit.

There is a further advantage to Agents in the fact that where a town is rated under the Universal Schedule, long titles of occupancy and whole paragraphs explaining reductions or changes in rates can be represented by the use of numbers, saving time in letter writing to the Company. It would be found in practice that Companies would require less explanation of a rate, knowing the system by which it is made, than under present systems, where the Agent is subjected to much trouble and loss of time in making explanations to his Company.

SPEED IN RATING.

The objection has been made to the Universal Schedule that it requires more time and, therefore, money, to fix rates under it than by prevailing methods; but those who framed it claim for it, and those experts who have been applying it will support the claim, that whatever extra time is required in rating will be found to be necessary for obtaining the facts of the risk in order to apply the schedule. In other words, whatever excess time is consumed in the process is that employed in investigating each risk from cellar to garret. It surely is not necessary to defend this feature of it. Any system of rating which does not thoroughly investigate a building and its various details of construction, occupancy and fire appliances is not a system of rating, but a system of guessing. When once the facts of a risk have been obtained the rate can be computed in less time by the Schedule than by any memorized process which affects to deal with the various features. It will be found in practice, that an expert can rate a risk more quickly

with the Schedule than without it. By rating a risk is, of course, meant the fixing of a proper price or figure upon each feature of it after a thorough inspection of the building from roof to cellar floor. Any test of comparative speed in rating should require, without argument, this "scratch line" as a starting point; the expert is to make the tour of the building, is to observe everything that ought to be seen and to fix a price upon it—the uniform price for the same feature in all cases.

He will rate more quickly with the Schedule for the reason that he will lose no time in considering or estimating any detail. It will be found that, at any point where the one rating by memory stops to recall his fixed charge for a particular feature—open staircase, wooden chute, elevator, well-hole, etc., etc., (it being assumed that he has a fixed and uniform charge)—he will be passed by an expert using the Schedule, who does not need to scratch his head in reflection, but has, already fixed for his convenience, prices made in advance by hundreds of competent men.

The objections made to the Schedule that it will take more time to apply it are generally found to emanate from men who contemplate a quick method of fixing rates by "jump" estimates. Men whose wives would not trust them to go to market without a memorandum list of items to be ordered, will yet complacently essay the task of rating, off-hand, a risk having a hundred features, each of which should be carefully considered in making the rate.

A competent expert will compute the rate of the most complicated mercantile risk by the rating slip inside of two minutes.

EMPLOYMENT OF MECHANICS.

Where a city is to be rated it will be found economical, both in time and money, to employ mechanics, intelligent carpenters or masons, to ascertain those facts as to features of construction, quality of bricks and mortar, thickness of walls, floors, flues, etc., etc., which these men can attend to as well as, if not better than, insurance experts. There is the further advantage that they can be hired for the time needed, by the day, at trade wages, and their services dispensed with so soon as the information is obtained.

IS THE SCHEDULE COMPLICATED AND HARD TO UNDERSTAND?

That is not the question. Is it right? Is it the correct way to make rates? If so, no one should shirk the task of studying it in a business where the margin of profit is so close, and where not merely success but solvency depends upon accuracy.

The business of insurance is no child's play. It involves considerations of architecture, fire prevention and extinction, chemistry, physics, arts, manufactures, commerce, and every enterprise of man, and the measure of these considerations with mathematical certainty. The schedule is not harder to understand than the school-boy task of long division which, however, was difficult in its novelty.

The preparation of the schedule has developed the most lamentable differences of opinion prevailing among experts, on points where the ignorance of those making mistakes has resulted in broken prices, which might have been maintained intact if the knowledge of all could have been collated and promulgated for the benefit of each, as it has been in the various provisions and rules of the Universal Schedule.

There could be no better illustration of the necessity of a Schedule of this character and of the importance of conference for securing combined judgment than in the present methods of rating stocks prevalent throughout the country, by which the costly experience of the companies as to the relative susceptibility to damage of various stocks is entirely ignored. It is mortifying to confess, what we may as well, however, frankly admit, that the major part of the knowledge held by underwriters to-day has been gained through the simple process by which a child learns to dread the fire. For want of a proper dissemination of this dearly bought knowledge, which too often lies useless at the head offices, the most damageable stocks are rated, in many cities, by local underwriters, at figures as low as those fixed for wholesale boots and shoes, package dry goods, &c. Thus, facts which have cost the Insurance Companies millions of dollars, and which are well known at the home offices, are not availed of for the conduct of their business through their agencies, the rates being made in the various cities and towns of the country by their local agents, who, while hon-

estly desirous of fixing proper prices, have no experience to guide them. Being the practical rate-makers of their companies, they are more potential for determining the prices of the business than the Companies they represent.

If a merchant should purchase a million dollars' worth of goods, Silks, Velvets, Satins and Calicoes, turn them over to the clerks in the different departments of his store with instructions to sell them at such prices as they should choose, withholding from them all information as to cost and depriving them of yard-sticks and other measures of quantity, his action would be regarded as sufficient evidence of mental aberration to warrant his being forthwith placed in an insane asylum; and yet this is practically what is being done to-day, in the insurance business, in hundreds of cities and towns throughout the country. The companies furnish the capital while the local agents sell the policies at such prices as they choose, without reference to quantity or the percentage of insurance to value. The most intelligent and conscientious among them, willing and anxious to fix fair rates and make accurate guesses at the facts, are deprived of the necessary information as to cost which lies useless in the head offices! Surely the time has arrived for a change in such business methods, and the accumulated knowledge of a century ought to be combined and utilized, by conference, for the good of all.

IMPORTANCE OF SECURING COMBINED JUDGMENT.

In view of the fact that no one Company, and certainly no one underwriter, can claim to have sufficient experience or knowledge for rating all classes of risks, it will not be denied that, in a business where an adequate price is so absolutely essential not merely to profit, but to solvency, rates should be fixed after a wide canvass to secure combined judgment. In no other way could any tariff be secured which would be more than approximately correct. There was a period in the business when wall-paper, for example, was regarded as a non-hazardous stock; in fact, only within a few years has it been known that the claims for water and smoke damage are exceptionally large and difficult to adjust, and to-day the knowledge of this fact is limited to a few. A claim was recently fixed by appraisal at a figure over $70,000, for water and smoke damage on a stock of wall-paper, which the

adjusters supposed was injured only to the extent of a few hundreds.

The same remark is true of hops in bales, and many other stocks, which are, to-day, in various towns and cities throughout the country, regarded as choice risks, and rated as low as wholesale boots and shoes and other non-hazardous package goods.

There could be no better illustration of the importance of conference than was to be found in an incident of the last convention of the various committees on the Schedule, held in the City of New York in November, 1892. On an important matter, involving the question of an allowance of 5 per cent., the convention was found to be nearly equally divided. The majority, however, in the debate which ensued, quickly convinced the minority of their error, and the final vote taken was a unanimous one. No comment was made upon the significance of the fact that, while 5 per cent. measures the entire profit over incurred loss and expense on the earned premium, nearly one-half of the underwriters in the room would have accepted the hazard under debate at a rate lower by the entire measure of profit than the other half. They would have done this honestly, and the incident enforces the argument that inasmuch as it may safely be claimed a majority of underwriters would not cut a rate below a figure yielding a margin of 5 per cent., that large amount of rate cutting which proceeds from ignorance and not from greed, would be prevented by a comparison of judgment and experience, and an interchange of knowledge.

The necessity of a printed list of stock rates should require no argument. There are more than twelve hundred different hazards of occupancy enumerated in the table. Even if an underwriter were capable of fixing correct charges for all of them and were independent of the knowledge and judgment of others, he would not be capable of remembering them one week with another. If they are right they are right, and ought not to be altered when once decided upon. A difference of 5 per cent. would mean profit or loss. The average rate of the entire list does not exceed 50 cents; a variation, therefore, of 5 cents (which would be 10% of 50 cents), becomes a fatal matter in a business where 5 per cent. of the earned premium measures the entire profit realized above incurred losses and expenses.

In no other business are salesmen permitted to ignore

carefully considered lists of prices—memory is not relied upon. The salesman in a hardware store, for example, is not permitted to sell even the single item of screws, except by reference to a price list, and, lest he should make a mistake, even with this in his hands, the bookkeeping department is required to check off prices before bills are forwarded.

The statement is frequently made that schedules or lists of risks and various classes of merchandise, with rates named, are not necessary in insurance, and that insurance experts can rate the various classes of merchandise to be found in warehouses and the various classes of hazards more intelligently by off-hand opinion than by a schedule systematically made and lists of prices carefully fixed:

I most emphatically do not believe in expert off-hand opinions as to rates, and especially as to that feature of a rate which measures the susceptibility to damage by fire, water and smoke. It is true, as claimed, that an expert in tobacco or in tea or in flour, or in any article of merchandise, becomes by long practice able to determine slight differences in value; but it must be remembered that the insurance expert cannot devote a lifetime to a particular class of merchandise, but must know off-hand the value and susceptibility to damage of hundreds of different articles. Of course, no one man can know much; it is only by canvassing for opinions and fixing the majority view in a printed list that anything approaching accuracy can be secured.

OCCUPANCY CHARGES,

LIST OF HAZARDS, UNIVERSAL SCHEDULE.

The following list of hazards has been compiled with the intention of making it as comprehensive as possible. It is believed that none worth considering has been omitted. Each class has been given the National Board Analysis or Classification number, which can be used for analyzing the fire-cost (*i. e.* fire loss per $100 of amount insured) so that the fire-cost not merely of such general classes as crockery, clothing, &c., may be determined, but the figures of loss on sub-divisions of these classes, some of which differ from each other almost as vitally as the general classes themselves. For example, class No. 807, Wholesale Drugs, without compounding, etc., (Dry Drugs only), should not be charged with losses on 806, Wholesale Drugs, with compounding.

The old classification "Merchandise, extra hazardous," comprised too many different hazards to make loss figures of the class of any value whatever.

It has been claimed that risks of a class differ so much as to exposures &c., that figures of fire cost would not indicate relative susceptibility to damage, but, in answer to this, it should be remembered that while risks of the various classes, Groceries, Dry-Goods, Apothecary Stocks, etc., vary as to combinations with other risks in the same building and also as to exposures, the average environment or exposure combinations of a class vary but little as a total. So large a number of risks of each class, 50,000, for example, might be secured by co-operation of a dozen large Companies, that while a particular grocery stock might be exposed by a dwelling house during one year and by a planing-mill during the next year, there would be, in so large a number of risks, compensating changes, and another grocery stock exposed by a planing-mill during the first year would be exposed by a dwelling during the second. The average fire cost per $100 of insurance on Grocery Stocks, therefore, while including the average exposure or environment hazard would, based upon a large experience, be an absolutely safe figure on which to estimate the relative susceptibility to damage feature, which has so much to do with rates. Moreover, the fire cost, including the average exposure, would be a perfectly safe figure for accepting or rejecting risks, especially as the underwriter has the opportunity of scrutinizing the exposure hazard of each risk as it comes up for insurance and of rejecting the more undesirable, if he cannot get a higher rate.

THE FOLLOWING TABLE OF OCCUPANCY CHARGES CAN BE USED WITH ANY SYSTEM OF RATING AS WELL AS WITH THE UNIVERSAL MERCANTILE SCHEDULE.

Being intended to measure, by the figure in the first column, the "ignitibility" and "combustibility" features of contents, and in the second column the third, "susceptibility" to damage, they can be added to a basis rate made by any other schedule for an unoccupied building, as well as to a basis or key rate computed by the U. M. S.

These three features of a risk may be treated as the superstructure of a rate, the foundation of which would be a figure which recognizes construction, faults of management, environment, fire department, etc., etc., the resulting rate being higher or lower exactly according to the system of underlying unoccupied building rate and according to the estimate made of peculiar local facts or environment. Even if the system of computing the unoccupied building rate, therefore, should differ from that of the Universal Schedule, the charges in the two columns measuring ignitibility, combustibility and susceptibility of contents will be regarded as relatively correct, one with another, and that the foundation rate to be added to these would be the only factor which would differ from the U. M. S. no matter what system should be followed.

A rough, off-hand estimate of what the final rate would be on an average risk, computed according to the Universal Mercantile Schedule, can be made by adding to the rates of the two columns, for building and stock, 50 cents in the case of brick buildings of average area, height and construction, and 125 cents for frame buildings. Most risks would be entitled to deductions from the resulting rate for water pails, force pumps and other fire appliances, and, in the case of buildings coming under the protection of good fire departments, a deduction of possibly 30% from the final rate would probably be secured under the U. M. S. Buildings of large area, exceeding 5,000 square feet, and (or) over five stories high—height and area being cumulative—would, of course, have a larger rate under the Universal Schedule.

If it is desired to fix a round rate for an entire plant, it should be intelligently made with reference to the porportion of the policy covering on building and contents. Specific amounts on each, however, should be insured in the case of special hazards, as in other risks, unless with a full co-insurance clause. There is no more reason for insuring the building and contents of a manufactory under one item than for insuring the stock of a dry-goods store and the building under one amount. The underwriter, for example, who insures the building and product of a silk mill at a round rate obtained by taking one-half of the sum of the two rates, where the amount of insurance on the stock is more than one-half of the amount of his policy, is either indifferent to profit or does not know the difference between a pink ribbon and a pink brickbat.

Whatever be the opinion formed, however, as to the correctness of the rates named, this list of hazards will prove valuable as the most comprehensive of any in print, and the feature of alphabetical arrangement —the order being carried to the fourth letter, for facilitating quick reference —will it is believed, be appreciated for other purposes beside the important one of rating. In addition to this careful arrangement, each risk, as will be seen, has been given a number, which facilitates quicker reference even than by the alphabetical arrangement. This number will save time in writing long titles, and serve for experience analysis, as already explained.

F. C. M.

HOW TO USE THE FOLLOWING TABLE.

RULE. From the rate of Building occupied, No. 128, deduct one-fourth of the deficiencies and then add the figure named in the second column of the table for the stock to be rated, proceeding with deductions Nos. 190, 191, etc., as per rating slip.

NATIONAL BOARD ANALYSIS NO.	CHARGES FOR OCCUPANCY. Note.—Where stocks are entered in two different places, alphabetically, the reference in each to the other is intended to prevent oversight in case of subsequent revisions of the table, so as to insure that if a rate be changed in one place it shall be in all. For example, Chinese and Japanese goods are entered under both C and J, with a reference in each place to the other. *Only one number, however, is assigned to both titles for Fire Cost Analysis.*	To the Rate at Nos. 127 & 128 as ascertained by the Schedule. Add to No. 127 for Insurance on Building.	Add to No. 128 for Insurance on Contents.
No.		Cents.	Cents.
400	Academies and Private Schools on upper floors of mercantile buildings, in cities,.	......	25
401	" and Seminaries in cities,..................	......	25
402	" " " " country,..................	......	25
	Acids, (see Warehouse, Nos. 1800, 1825)..........		
403	" Manuf'y*..................................	125	75
404	Adze Manuf'y. (see Hardware Manuf'y)............	50	50
405	Agricultural Implements, Stocks of*...............	10	50
406	" " Manuf'y* Steam Power,..	200	50
407	" " " Water " ...	150	50
	Add for any exposure† by Boiler Room Hazard No., 527, Painting, No. 1267, Dry Room, No. 814.		
408	Alarms, Fire, Burglar, Annunciators &c., Manuf'y,.	40	60
409	" " Stocks of,..........................	......	75
410	Album Manuf'y.,.................................	50	100
411	Alcohol and High Wines, in bbls., or casks.........	25	50
	" If included in Drug Stock, covered by drug stock rate,..............................		
412	Ale Houses, (see Saloons).........................	5	45
413	Ale, Beer or Porter, in bottles, cased,...............	......	50
414	" " " " " bbls., or casks,...............	......	40
415 b	Almshouses, brick, (see also Poor Houses,)..........	100	25
415 f	" frame,..............................	100	25
417	Aluminum Manuf'y.,..............................	75	50
	Ammunition, fixed, M'f'y. (see Cart. M'f'y No. 646).		
418	Anchors, Anvils,.................................	......	10
419	Animal Black, Animal Charcoal, Bone Black &c. Mfy.	300	300
	Animals, Live, domestic, (see Live Stock)..........		
420	" " wild, tamed or untamed,..........	50	300
421	Apartment and Flat Houses,*......................		
422	" " " " Coal and Wood Shafts and Stairway and Elevator Shafts of Brick or Fireproof,....		
	If first floor Fireproof, deduct 10 %.		

*See specific Schedule for class, pending preparation of which these rates on Manufacturing and Special Hazard Risks tentative only.

†By which is meant a charge according to the facts. If the Boiler Room, for example, is Fire Proof or so thoroughly isolated that it could do no damage, no charge should be made to other portions of a risk.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
423	Apothecaries, Retail	10	50
424	Architects,	.....	75
425	Armories,	25	25
426	Art Galleries, (see Pictures, 1314)	......	75
427	Artificial Eyes Manuf'y. (see Eyes)	40	85
428	" " Stocks of	......	75
429	" Flowers, Feathers and Millinery Stocks	......	100
430	" " " " Manuf'y.	25	100
431	" Hair, (see Hair)	......	75
432	" " If vegetable fibre used,	10	75
433	" Limbs Manuf'y	50	75
434	" " Stocks of,	......	75
435	Artists' Materials, Dry Plates excluded (See No. 1302)	10	75
436	" Studio,	......	75
437	Asbestos Goods M'f'y	20	40
438	Asphalt and Roofing Material M'f'y. (see Roofing M.)	300	100
439	Assayers, Gold and Silver Refiners, (see 990)	20	55
440	Asylums, Deaf, Dumb, Blind, Aged, and Orphan	25	25
441	" Insane, (see also Almshouses)	35	25
442	Athletic Goods, Stocks of (see Sporting Goods)	10	50
443	" " Manuf'y	100	75
444	Auction Stocks,	10	90
445	Autographic Sales Register Manuf'y	50	75
446	" " " Stocks of	......	75
447	Awning, Sail and Tent Makers,	10	60
448	Axe Factories, no wood work	30	30
449	Axle Grease in casks, kegs or cases, (see Grease)	25	50
450	Bag Factories,* Cloth, Cotton, sewing & print'g only,	30	70
451	" " Gunny Bag, " " "	75	75
452	" " Traveling, Leather, (No Trunk making,)	50	75
453	" " Paper,	25	75
454	Bagging Factories,*	200	100
455	Bakeries, Small retail, oven outside,	10	65
456	" " " " inside, safely set.	25	75
457	" " " " with doughnut and cruller stoves inside, add	25	25
458	" Large steam, Bread, Cake or Pie,	125	125
459	" Steam Cracker,	100	100
460	Baking Powders, Manuf'y	60	65
461	Bamboo Furniture, Manuf'y,	50	75
462	" " Stocks of	10	60
463	Bananas, Ripening with gas heat,	25	100
464	" " " other than gas heat,	50	100
465	Banks and Bank furniture,	......	10
466	Banners and Flags Manuf'y	50	100
467	" " " Stocks of	......	85
468	Barber Shops,	.....	35
469	" Supplies with Manuf'g	50	100
470	Bark Extract, in cans,	......	45
471	" Mills,	300	200
	" See Next Page		

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate.	Add for cont'nts Rates.
	Bark, continued.	Cents.	Cents.
472	" piled in woods,	.....	1000
473	" " near railroad,	......	500
474	" " near a paying city or town Tannery, same rate as the Tannery		
	Barns (see Farm Property No. 876, 882)		
475	Barrel Manuf'y* (see Cooper shop 733),		
	Bar-rooms (see Saloons),		
477	Base Ball Manuf'y (see Athletic Goods),	50	75
478	Basket Manuf'y	50	100
479	" and Willow Ware Stock,	15	85
480	Bath-houses, City, Turkish, Russian, &c.,	25	50
481	" Public, Lake, Seashore,	50	50
482	" Health Springs,	50	50
483	Batting and Wadding, Cotton Stock, (see Wadding).	20	80
484	" " " Manuf'y*	300	200
485	Bead Work, Passementerie and Trimming Stocks, (See 602)	......	75
486	Bedstead Manuf'y Brass, (see 556)	50	75
487	" " Iron,	50	50
488	" " Wood,*	250	100
488a	Bedding Manuf'y " " Add for 527, 1267, 814		
489	Beef Dealers (wholesale), (see Butchers, 590)	......	45
490	Bellhanger Shops,	5	45
491	Bell Manuf'y, no handle work,	25	50
492	" " with " "	50	75
493	Bellows Manuf'y	50	75
494	Belting and Hose Manuf'y, less than 10 hands, over 10 hands, add 1 ct. for each 10 hands in excess of 10 to both columns	10	50
495	Bicycles, Factories,	50	100
496	" with wood rim m'fg., Japanning and Enameling	75	100
497	" Stocks of, without repairing,	......	60
498	" " " with repair shop,	15	60
499	Billiard Cue Manuf'y	75	75
500	" Saloons,	10	65
501	" Table Manuf'y	150	150
502	Bill Posters,	25	75
503	Bird Cage Manuf'y	50	75
504	" Stores,	10	140
505	Blacking Manuf'y (shoe).	100	100
506	" " (stove), no Naphtha,	100	100
507	" " " with Naphtha,	200	200
508	Blacksmiths, hand power, no woodwork,	25	35
509	" and Wheelwright,	75	50
510	" steam power. (see Machine Shop Sched	30	30
	Blank Book Manuf'y (see Book Binderies, No. 534,).	25	60
	Blast Furnace, (see Iron Furnace No. 1081,),		
512	Bleacheries, Dye and Print Works,* (see 827)	125	75
513	Blind, Sash, and Door Manuf'y* (see Sash and B.)	200	100
514	" " " " stocks (no m'f'g). Add for any exposure by Boiler Room No. 527, Painting Hazard (No. 1267,) Drying (No. 814,)	50	100

*See Specific Schedule for class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
515	Block and Pump Manuf'y (see Pump Manuf'y 1367)	75	75
516	Boarding Houses, private........................ Not over 15 Bed-rooms and no bar, if bar add 25 cents, and add 2 cents for each Room in excess of 15.	5	20
517	" " Large city, add 1 ct. for each bedroom in excess of 15,..........	......	
518	" " for employees of contractors on Railroad, Dam, Bridge work, &c., generally bad flues,..............	150	50
519	" " for mill hands, permanent, good flues, no stove pipes through windows.........................	100	25
520	Boat Builders, Wood, (see Paper boat, No. 1269,)...	100	50
521	Boats and Boat Houses, Public, Hotels, &c..........	50	50
522	" " " " Clubs,....................	50	50
523	" " " " Private,..................	25	25
524	" Stocks of for sale, no Manuf'y...............	25	50
525	Bobbin and Shuttle Manuf'y, (See Shuttle,)........	150	100
526	Boiler Makers....................................	25	25
527	BOILER ROOM HAZARD—Should be cut off absolutely in all wood-working risks, and in other kinds of risks if other than coal fuel is used, especially if shavings or slabs are used for fuel. The furnace feed should not be in line with any communication with the main structure, but at right angles to it, so that in case of a "back draft" the burning contents of the furnaces cannot be thrown into the other rooms of the risk. Probably the most dangerous form of boiler-room is where the boilers are below a ground floor, especially if the space above the boilers be used for drying purposes, piling of lumber, etc. The masonry arches over the furnace, no matter how well set, yield in time to the effect of heat and cold, by expansion and contraction, and, in the case of wood-working risks, a combustible stratum of dry material collects above the arch, to be eventually ignited as a certainty. If boiler rooms are safely arranged and entirely cut off add........	25	
	" " If boiler-room inside below floor of main structure, in other than woodworking risks, (No Shavings burned).......	75	
	" " If boiler-room inside, below floor of main structure, in wood-working risks,	600	200
	" " Petroleum Fuel, see regulations.......		
528	Bolt and Nut Works,* (see Nut & Bolt)...........	125	75
	Bone-black,† Ivory-black and Animal-black Manuf'y. (see 419)	300	300
530	Bone Mills, (usually nuisances),.....................	300	200
	Bonnet Manuf'y (see Millinery),....................	25	100
532	" and Hat Frame Manuf'y.........	50	50
533	" " " Bleaching,......................	50	100
534	Bookbinderies, (see Blank Book, No. 511)...........	25	60
535	Book lettering,....................................	15	85
536	Books and Stationery, Stocks of (see Stat'y)...	......	75

*See Specific Schedule for class. †Liable to Spontaneous Combustion.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
538	Boots and Shoes, wholesale, no manufacturing,.....	......	40
539	" " " Jobbers' Stock, in cases only,......	......	35
	" " " Mf'y (see Shoe Mf'y, No. 1451 &c.)		
540	" " " Retail, with repairing,............	......	45
541	" " " Rubber, package only (see India R.)	......	30
542	Bottling Establishments, Cellars, etc.,.............	15	75
543	Bowling Alleys,.............................	25	50
544	Boxing Glove Manuf'y........	50	75
545	Box Factory*—Cigar (see Cigar Box Manuf'y)......	75	75
546	" " Paper, hand power,................	25	100
547	" " " steam "	50	100
548	" " " water "	25	100
549	" " Wooden,* packing box, hand power, .	125	50
550	" " " " " steam* " .	250	100
551	" " " " " water " . add for any exposure by B. R. No. 527, Painting No. 1267 Dry Room No. 814,	150	100
552	Braid Manuf'y (Not Straw) Knitting, &c. Not exceeding 15 hands weaving..........	25	60
553	" " Straw............................	40	60
554	Brand, Stencil and Stamp Manuf'y (see Stencil),....	10	50
555	Brass Foundry (see Foundry),.................. .	40	35
556	" Bedsteads, Stocks of, (for manuf'y see 486)...	.....	50
557	" Goods, Stocks of,........................	......	50
558	" Works, with Buffing,.....................	50	50
559	Breweries,* Ale or Beer, no malting,.............	40	40
560	" " " " with " Add for any exposure by Kiln, (No. 1100,).		
	" (see Kilns, No. 1100).................		
561	Bric-a-brac and Curios, Stocks of,.................	25	125
562	Brick Manuf'y..................................	200	25
563	Bridges, covered R. R.,.....................150 cts.		
564	" " free,......................75 "		
565	" " toll,.................... 100 "		
566	" open or deck R. R.,..............100 "		
567	" " " " free,.................70 "		
568	" " " " toll,..................80 "		
569	Britannia Ware Manuf'y.........................	40	50
570	Broom Corn in bales,...........................	50	75
571	" Manuf'y................................	175	75
572	Bronzes (see Clocks),.........................	......	50
573	Brush Stores, no manufacturing,.................	25	25
574	" " with "	25	75
576	" Manuf'y., no wood work,............	50	100
577	" " If pitching inside add 25 cents to first Column......................	75	100
578	" " with wood-work handles, add 50 cents to rates of first Column......		
580	Bucket and Pail Manuf'y, Metal,..................	40	50
581	" " " " Paper,..................	75	50
582	" " " " Wood,.................	200	100
583	Builders' Risks—Construction Hazard, charge short rates of 50 cts. per $100 in addition to rate of risk. If risk unoccupied or not rated short rates of 125 for the time..................................		

*See Specific Schedule for Class. †Liable to Spontaneous Combustion.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
584	Building Materials, Lime, Hair, Cement, &c.,........ N. B.—If Lime not above tide water or if improperly covered decline,	100	50
585	Bunting Manuf'y* (see also Banners, &c,, No. 466,)..	75	75
586	Burlap, with hand sewing only, (See 451,).........	75	75
587	Burial Case and Coffin Manuf'y., Metal,............	75	50
588	" " " " " Wood,...........	200	50
589	" " " " Stocks of,.................	15	60
590	Butcher Shop, no rendering or smoking, (see 489)...	.....	45
591	" " rend'g and smoking, for own trade,..	10	45
591a	" Supplies, Manuf'y of................		
592	Butter, Cheese and Eggs, (See Cheese &c.,).......	.....	50
593	Butterine Stock. No Rendering,.................	.....	75
594	" " With Rendering,................	50	75
595	Button Coloring and Finishing with Varnishing,....	75	75
596	" Hole Making,..........................	25	50
597	" Manuf'y* Bone, Ivory, or Pearl,...........	40	60
598	" " Bright Metal,.....................	25	100
599	" " Cloth covered,....................	75	75
600	" " Vegetable Ivory,................	150	150
601	" " Wood,...........................	50	75
602	Buttons and Trimmings, Stocks of No. 485,.........	.....	75
603	Cabinetware, Furniture, etc., no finishing or upholstering,..............	25	75
604	" " " with finishing and upholstering, not less than	50	75
	" " Factory* (see Fur. Facty 954).		
605	Candle Manuf'y*..............................	125	125
606	Candy and Confectionery Manuf'y*...............	100	100
607	" " " Stores, no manufacturing	.....	60
608	" " " " small, manufacturing for own retail trade only.......	15	60
609	Cane Manuf'y.................................	50	75
610	Canes, Whips and Umbrellas, Stocks,..............	10	50
611	" " " " with Manuf'g. No stick work,	25	75
612	" " " " " " with stick work,	50	75
613	Canned Foods exclusively, stocks of (Fish, Fruits, Meats, Vegetables,).....	.....	40
614	Canning Fact'y (Fish, Fruit, Meat, Oyster, Vegetable)	150	50
" a	" " with tin shop...................... Add for Gasolene, No. 969.	175	50
615	Cap and Hat Mfy. Cloth or Felt, less than 100 hands.	20	80
616	" " " " more than 100 hands add 1 cent to each column for every 5 additional men, but total rate not to exceed....	50	100
617	" " " Straw Goods (see Straw Goods,).	40	60
618	Carbon Point Works,...........................	150	100
619	Card-board Manuf'y*............................	150	150
620	Card Clothing Manuf'y*........................	150	150
621	" Playing, Manuf'y*.......................	75	75
622	Cars Manuf'y*.................................	200	100
	" See next page.		

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate.	Add for cont'nts Rate.
	Cars continued.	Cents.	Cents.
623	Car Stables or Barns, Horse or Street Car,..........	200	100
624	" " Electric R. R........................	200	100
625	" " Gas Motor,..........................	200	100
626	" " Cars in............................	200	100
627	" " If cars stove heated add 25 cents.......		
	" Railroad, (See Railroad, No. 1373 &c.).......		
628	" Wheel Manuf'y Iron,........................	25	50
629	" " " Paper,.....................	75	50
630	Carousels, "Merry-go-rounds", &c.,................	100	100
631	Carpenter Shop*—Steam Power,..................	200	100
	Add for any exposure by Boiler Room, No. 527, Painting, No. 1267 Dry Room, No. 814,...........		
632	" " Hand Power only,.............	100	50
633	" " Electric Power, small............	110	50
634	Carpets, Rugs and Oilcloths, with sewing, stocks of,	......	40
635	Carpet Cleaning Establishments (usually "nuisances")	100	150
636	" " using Naphtha to sprinkle carpets.	150	150
637	" Lining Manuf'y...........................	200	150
638	" Manuf'y* Steam Power,....................	50	50
639	" " Water "	40	50
640	" " Hand "	25	25
641	" " Rag, hand power,................	50	50
642	" " Wood, Parquetry,..............	150	100
643	Carriage and Coach Manuf'y,* with painting........	150	100
644	" " " Stocks of, no Manuf'y.........	.....	50
645	" " " Painters,......................	50	50
646	" " " Trimmings, Stocks of.........	......	50
646½	Cartridge Manuf'y, loading isolated,...	200	200
647	Carving, Stone,................................	.....	100
648	" Wood,................................	25	125
	Cattle, (see Live Stock, 1155 &c.),....		
649	Celluloid Manuf'y*.....	300	200
	If Manufacturing Gun Cotton for sale, double rate,.........................		
650	" Goods, Stocks of......................	100	150
	Cement Drain Pipe, Manuf'y, (see 800)............	100	50
652	" " " Stocks of..................	......	40
653	Cement Mills,*................................	150	100
654	Chair Manuf'y*................................	200	100
	Add for Boiler Room, No. 527, Drying No. 814, Painting, No. 1267,........................		
	Chandelier Manuf'y (see Gas Fixture M'f'y No. 966.)	50	75
656	Chandlery, Ship Stores,........................	25	60
	Chapels, see Churches,..........		
658	Check Rower Manuf'y*.........................	200	100
659	Checks, Baggage, Manuf'y with Acid,............	25	50
660	Cheese Fact'y, Co-operative (owned by patrons,)	75	50
661	" " not Co-operative,.................	150	100
	" Stocks of (see Butter and Eggs 592)........	......	50
662	Chemical Laboratories, (see Laboratories)..........	60	65
663	" Manuf'y* or Works,...................	125	75

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued	Add for Build'g Rate. Cents.	Add for cont'nts Rate Cents.
	Chemicals (see Drugs and Warehouse Tariff).......		
	Salt cake, sulphate of soda, sulphate of potash, muriate of soda, muriate of potash, NON-HAZARDOUS.		
	Saltpetre, nitrate of potash, nitrate of soda, nitrate of ammonia, chlorate of potash and other chlorates, if *separately stored*, EXTRA HAZARDOUS		
	Fulminates of silver or mercury, ethers, sweet spirits of nitre, nitro-benzol, methylic alcohol, bi-sulphide of carbon, metallic potassium, metallic sodium, quick-lime, phosphorus and bi-chloride of tin. Also, saltpetre, nitrate of potash, nitrate of soda, nitrate of ammonia, chlorate of potash and other chlorates, *when stored with other merchandise*, SPECIAL.		
664	Chewing Gum Manuf'y,..........................	100	100
665	China Decorating, no firing,.......	10	65
666	" " with firing,....................	60	65
667	Chinese and Japanese Goods, (see Japanese),........	10	80
668	Chocolate and Cocoa Manuf'y,.....................	100	100
669 b	Churches,* Brick or Stone, Furnace heated,........		
670 b	" " " Steam "		
671 b	" " " Stove "		
669 f	" Frame, Furnace heated,................		
670 f	" " Steam "		
671 f	" " Stove "		
675	Church Goods, Books, Statuary &c., no Manuf'y. ..	......	100
676	" Organ in Church, ...	......	75
677	Cider Mills,..	75	75
678	Cigarette Manuf'y.....	200	100
679	Cigar Manuf'y. Other than Hand Power..........	40	85
	" Box Manuf'y (see 545)......................	75	75
680	Cigars and Tobacco, Stocks of, Wholesale, no m'f'g	5	70
681	" " Retail,* with manufacturing for own retail trade, hand-power, no dry room,..............	10	75
682	" " with dry room,...............	60	90
683	Cleaning and Dyeing, (see Dyeing, &c.)............	100	100
684	Cloaks and Mantillas, no manufacturing............	10	75
685	" " with "	20	80
686	" " cutting only,................	15	85
687	Clock Manuf'y......................................	75	50
688	Clocks, Watches and Jewelry, retail..............	......	50
689	" " " wholesale.........	......	50
690	For Jewelry in safes, specific insurance and full co-insurance clause, deduct 33⅓ % of final stock rate for value of jewelry in safes.		
691	" Case Manuf'y..........................	100	100
692	Clothing Manuf'y. Less than 100 hands..........	20	80
693	" " if more than 100 hands, add one cent to each column for every five additional men, but total rate not to exceed.........................	50	100
694	" Stock in hands of working tailors ("floaters")	25	175
695	" Stocks of, Retail.........................	5	55
696	" " " Wholesale, no manufacturing...	5	55
697	" " " " with cutting, but no manufacturing......	10	60
	" See next Page.		

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate	Add for cont'nts Rate.
	Clothing, continued.	Cents.	Cents.
698	Clothing, Stocks of, Wholesale, with manufacturing	20	80
699	" with cutting, pressing and busheling.....	15	85
700	" repairing and cleaning, small quantity naphtha..................................	25	85
	" Oil, (see Oiled Clothing, No. 1251)..		
701	" Second hand, stocks of (see 1436)..........	100	200
702	Cloths, Cassimeres, Beavers, Broadcloth, Worsteds etc	......	40
703	Cloth samples pasted on Cards, with Cutting.	20	80
704	Club Houses City................................	25	25
705	" " Boating............................	50	50
706	" " Hunting and Sporting..............	50	50
707	" Rooms, with bar and restaurant.....	30	30
708	" " without bar and restaurant......	10	30
709	Coal Breakers*....................................	150	50
710	" Cannel, not protected from weather	150	50
711	" " protected " "	50	50
712	" Mine buildings..................................	100	100
713	" Pockets..	100	25
714	" Yard and Wood yard (see also Wood)........	100	25
714a	Coke Works..		
715	Cobblers (see also Shoemaker)....................	10	40
	Cocoa and Chocolate Manuf'y, (see Chocolate, No. 668)	100	100
716	Coffee and Spice Mills, special* (see Spice 1488).....	200	150
717	" Tea and Spice Retail Stores, no roasting.....	10	50
718	" " " wholesale " "	......	50
719	" roasting and grinding, Standard roasters &c.	150	100
720	" " If roasters on wooden floor or floor supported by wooden beams........	200	200
	" " If wooden troughs used for hot coffee add 25 cts. each column............		
	Coffin Manuf'y* (see Burial Case Manuf'y, 587, 588)		
721	Cold Storage Ware Houses Bdgs..................	50	
721c	" " " Contents (see Warehouse Tariff)	......	125
	Collar, Cuff and Shirt M'f'y (see Shirt M'f'y No. 1445)	50	75
724	Colleges and Academies,..........................		25
725	College Dormitories................................	......	25
726	" Laboratories..........	25	50
	Color Works (see Paint Nos. 1258, 1259)............	150	100
728	" Aniline Manuf'y..............................	150	100
729	Comb Manuf'y Horn (see Rubber, Celluloid &c.,)...	40	60
730	" " Tortoise Shell.....................	10	115
	Confectionery. See Candy, no manufacturing. 607..	......	60
	" Small manufacturing for own trade only No. 608....................	15	60
	" manufactory No. 606..............	100	100
731	Convents and Monasteries.........................	......	25
732	Cooper Shops small, hand power..................	25	50
733	" " large, steam* " (see Barrel M'f'y 475)	250	100
734	Copper Mine Buildings............................	100	50
735	Copper Smiths.................................. ..	40	50
736	" Stamp, Mills..........................	100	50
737	" Tube Manufacturing........................	30	40
	Cordage and Rope Walks (see Rope Walks, No. 1412	150	100
739	Cord Wood piled in Woods.........................	......	1000
	" " See next page.		

*See Specific Schedule for Class.

	COFFEE PREPARING ESTABLISHMENTS.	Add for Build'g Rate.	Add for Contents Rate.
		Cents.	Cents.
719	CLASS A. **COFFEE PREPARING ESTABLISHMENTS.**		
	Coffee milling, polishing, separating, mixing, grinding etc., with power	30	**60**
	CLASS B.		
	Coffee roasting, using only gas fuel, standard equipment, fire-proof floors, metal cooling pans, metal troughs, metal conveyors, and metal hoods over roasters	50	**75**
	CLASS C.		
	Coffee roasting, Standard equipment using other than gas fuel	75	**85**
	CLASS D.		
	Coffee roasting, gas fuel, standard equipment except floors built of wood well covered with brick or cement	75	**85**
	CLASS E.		
	Coffee roasting other than gas fuel, non-standard equipment, non-fire-proof floors, etc., not less than	150	**120**

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
	Cord wood, continued.		
740	" " piled near Wagon Roads not exposed to Forest or Prairie fires.............	......	250
741	" " " near R. R.........................	......	300
742	Corks and Corkwood Stocks, no cutting or manuf'y.	......	50
743	" " with cutting and manufacturing, not less than.............	50	100
744	Cork Manuf'y, no Grinding......	125	125
745	" " with Grinding.......................	300	100
746	" Leather Manuf'y............................	125	125
747	Corn in Cribs near R. R..........................	.....	100
	" " " on farms (see Farm Property, No. 883)		
748	Cornice (wood) Manuf'y...........................	200	100
749	" (metal) "	40	50
750	Corn Meal Mill.............................	150	50
751	Corsets, Stocks of, no manufacturing......	......	60
752	" " with "	25	75
	Corticine Manuf'y (see Floor Cloth, No. 917).......		
753	Costumers. See also Theatrical Goods.............	10	90
754	Cotton Brokers, Office, with Samples............. add for each office in excess of one, 5 cents to each column.	10	65
755	" Gins, Steam Power..........................	700	300
756	" " Animal "	600	200
757	" in Transit, Rail Roads or Steamboats.......	.....	400
758	" Mills. First Class. Modern mill construction, open finish, no furring on walls or concealed spaces between floors; heavy beams, double floors; staircases, elevators, pickers and drying process cut off—latter by cold air only. First-class private Fire Appliances......................		
759	" " " " Weaving only, purchasing warps and yarns; no picking or spinning.........		
760	" " Second Class. Good construction, mill floors single with ordinary beams; stair cases and elevators not cut off, but pickers and dry-rooms separated.............		
761	" " Third Class. Plastered ceilings, furred walls, poor fire appliances; elevators and staircases not cut off, but pickers separated.................		
762	" Platforms R. R..........	200	150
763	" Presses..................................	200	100
764	" Seed-Oil Mills*............................	200	100
765	" Sheds (no press)...........................	150	50
766	" Storage,..................................	125	50
767	" Warehouses*...............................	125	50

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
768	Counters, Shoe, Manuf'y (see also Shoe Counters)..	100	100
769	Country Stores (cross-roads) with dwelling,........	25	35
770	" " " without "	40	35
771	" " in villages (see 934, &c.)..........	20	40
772	Court Houses with Jail..........................	50	25
773	" " without Jail.........................	25	25
	Cracker Bakers, (see Bakery No. 459),............	100	100
774	Creameries.....................................	50	50
775	Crematories....................................	100	25
776	" for Garbage (usually "nuisances").......	300	50
777	Creosote Works, Wood preserving etc..............	300	200
778	Crockery, China and Glassware, if packing and unpacking, packing material not kept in boxes..............................	25	60
779	" If packing material kept in bins or boxes...	10	55
780	Crucible Manuf'y................................	125	50
	Curios, (see Bric-a-brac, No. 561),...............	25	125
781	Currier Shops* not over 10 hands..................	150	100
782	" " if " " add 1 cent for every 5 hands to both columns............		
783	" Supplies, no grease, See Oils, Heavy.......	25	50
784	Cutlery Manuf'y*................................	25	75
785	" Grinding (see also Grinding)..............	25	75
786	" Stocks of, no paint or oils.................	......	75
787	Cycloramas, Panoramas &c., (see Panoramas)......	50	150
788	Dancing Halls, no stage (see Halls)................	15	40
789	Decorators and Painters...........................	40	60
790	Dental Depots, Supplies..........................	......	50
791	" Goods Manuf'y...........................	50	75
792	Dentists, with Laboratory..........................	10	40
793	" without Laboratory.....................	......	40
794	" Gas making (see Laughing Gas)..........	50	100
	Department Stores (see Dry Goods, 810 and p. 752) .		
	Depots, R. R. (see Railroad, No. 1378).............		
795	Derricks, Hoisting Works..........................		
796	Derricks, Floating.......................150 cts.		
797	Die Sinker.......................................	10	50
798	Distilleries*.....................................	200	50
799	Distilling Apparatus, Manufacturer of, same as Copper-smith....................	40	50
	Doors, Sashes and Blinds, Stocks of, with Glazing (see 514).....	50	75
800	Drain and Sewer-pipe Manuf'y (see Pipe, also 651).	100	50
801	Dredges, Steam, policy to locate,...........300 cts.		
802	Dressmakers.....................................	5	70
	Dress Patterns (see Patterns 1287)................	......	150
804	Drug Mills.......................................	150	150
	Drugs, Retail† (see Apothecaries 423).....	10	50
806	" Wholesale,† with compounding.............	100	85
807	" " without compounding, dry drugs† only	40	85
808	Druggists' Sundries (see also Warehouse, No. 2206)..	25	75
809	Dry Docks.......................................	100	25

*See Specific Schedule for class.

†For warranty in policy to keep poisonous stock separate from rest, deduct 5 % from Stock Rate.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont nts Rate. Cents.
810	Dry Goods, Department Stores, large general stocks, etc., containing wood and willow-ware, house-furnishing goods, millinery department, dress and cloak making, crockery, &c., &c., in addition to dry goods, all under one roof, such as are to be found in large cities, special rates not less than (see page 35)...........................	15	70
811	" " Retail,.	......	50
812	" " Wholesale.......................... .	......	40
813	" " " original packages only, not exceeding 10 % of stock open...	......	25
	Dry Plates, (see Photo. No. 1302).................		
814	Dry Room Hazard—For Wood, Lumber, etc., The steam or hot water pipes should be either above the material to be dried or at the side of it, and not below the material, where distillations of pitch, resin, etc., shavings-sawdust or other ignitible substances can fall and collect upon them. If safely arranged.......	200	100
	If steam or water pipes arranged below the material to be dried...	600	400
815	" " for Textiles, Wool, Cotton, etc.,........ If the steam or hot water pipes are arranged so that the material cannot touch them or fall upon them......	100	100
	If arranged under the material, or where the material or dust from it can reach the heated surfaces..	300	300
	Cold Air Dryers, No heat used, add to rate of build'gs and contents..	15	15
	N. B. Any system of drying which admits of the falling of material or dust, shavings, &c., upon heated surfaces is dangerous.		
816 b	DWELLINGS, city, town and village—Brick or Stone, metal, slate or gravel roof......		
817 b	" " " " " Brick or Stone, shingle roof..		
816 f	" " " " " Frame, metal, slate or gravel roof		
817 f	" " " " " Frame, shingle roof...		
	" FARM, (see Farm Property),.............		
820	" LARGE, including so called "palatial residences." These sometimes approach the physical hazard of summer hotels, and fires have been discovered burning briskly in one portion of the building while the inmates in another portion were entirely ignorant of the fact. Losses are generally total.* Where a dwelling exceeds in value by more than 50 % the average of those in its vicinity it would be difficult to find a purchaser in case the owner should wish to sell, or in		

*A five year fire record of the class within a radius of 25 miles of the City of New York, showed losses of $1,000,000, or $200,000, per annum. This would have required a yearly premium of $360,000 for a 55 % loss ratio. The class did not yield one-half that sum at prevailing rates which proved inadequate.

	DEPARTMENT STORE OCCUPANCY CHARGES.	Add for Build'g Rate.	Add for Contents Rate.
		Cents	Cents
810	CLASS A. **DEPARTMENT STORES.**		
	All or any of the following:		
	Dry Goods, Carpets, Rugs, Boots and shoes, Dress-making, Toilet Goods, Upholstery Stock (materials only), Millinery, Clothing, Livery, Cloaks, and Mantillas, Hats and Caps, Photographic Supplies, Fancy Goods, Books and Stationery, Silverware, Jewelry, Bags and Pocketbooks, Chinese and Japanese Goods, Restaurant (cooking safely arranged)............................	20	55
	CLASS B.		
	If, also, any or all of the following:		
	Bronzes, Glassware, Crockery, Lamps (all packing material in bins; if not in bins charge under faults of management No. 143, 15 cents), Upholstery, (curtain making only), Bric-a-brac and Curios, Trunks, (no repairing) Toys, Sporting Goods, Fishing tackle, Guns, Bicycles, Sewing Machines, Harness and Horse Supplies, Photographing, Wines, Liquors and Cigars, Canned Goods, House-furnishing Goods, Kitchen Goods, Carriages, Pictures and Frames (no work)..................	25	60
	(This rate covers also Class A, the higher rate including the less.)		
	CLASS C.		
	If, also, any or all of the following;		
	If repairing trunks, or picture framing...........	35	60
	Furniture, Mattresses, Wood and Willow Ware...	40	70
	If repairing, varnishing or upholstering furniture, mattress making other than hair................	50	70
	If hand picker, not in fire-proof room add 25 cents to first column.		
	(These rates cover also Classes A and B the higher rate including the less.)		
	Packing and unpacking not cut off add 10 cents to first column.		
	If packing room cut off and sprinklered deduct 10% from first column charge—unless deduction has been allowed for Automatic Sprinklers.		
	POWER—Steam or electric for running shafting, increase first column charge of class 10 cents.		
	ORGANIZATION of employees for extinction, fire drill, etc., deduct .02 both columns.		

No.	CHARGES FOR OCCUPANCY, continued	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
	Large Dwellings, continued.		
	case he should die and his estate should have to be divided. The rate should approximate an increase over ordinary dwelling rates by 1 % for each 1 % excess of value over the average. Thus a dwelling 50 % more valuable than the average of its neighborhood ought to pay 50 % more rate; one of double the average value should pay double rate. In "boom" towns expensive dwellings are often erected for speculative purposes to add to the value of surrounding property for sale and are poor risks. Refer all dwellings exceeding $50,000 in value, in cities, to the Company, and, also, country or suburban dwellings exceeding $20,000 in value, before binding.		
821	" MINERS', owned by miners........75 cts.		
822	" " owned by Mining Co.......65 "		
823	" MILL, owned by company.........60 "		
824	" SEASON—SUMMER OR WINTER. A moral hazard is frequently involved in these, especially on a yielding sea-shore, where the cost of bulkheads for protection from storms is frequently an onerous burden. Mutual exposure, also, is an important factor, where they are near together. The rate should be 50 % more than for ordinary country dwellings, and should be still higher where they are exceptionally large and expensive..........50 cts.		
825	" ON CAMP-MEETING GROUNDS.... .75 cts.		
	Dwelling Occupancy in Mercantile Bdgs. (see Deductions, Nos. 169, 203 U.M.S.)		
	Dyeing and Cleaning Establishments, (see No. 683)..	100	100
827	Dye and Print Works (see Bleacheries).............	125	75
828	Dye-Stuff (Extracts in cans)......................	......	50
829	" " with Acids, Chemicals, &c...............	50	50
830	Dye-wood, grinding and manuf'g...................	100	100
	Add for any exposure by Boiler R. No. 527.		
831	Dynamo Electric, Manuf'y.........................	50	100
	Earthenware (see Crockery No. 778)................		
	Eating Houses (see Restaurants 1401)..............		
	" " R. R. (see Restaurants 1403)........		
832	Edge Tools Manuf'y (see Tools Manuf'y, 1575)......	50	75
833	Effervescing Salts Manuf'y, with Steam Dry Room.	100	100
834	Eggs, Stocks of..................................	......	60
835	" with Candling...............................	......	70
836	Elastic Fabrics Manuf'y..........................	75	100
837	" " Stocks of...........................	20	80
838	Electrical Supplies, Stocks of....................	20	80
	Electric Car Stables or Barns (see Car Stables 624)..		
839	" Light and Power Plants.* Large (also private plant, supplying current outside its own premises)......................	100	10
840	" Time Station...............................	25	125
841	" Wire Manufacturers.........................	50	100
842	" Goods, Manufacturers of (see Dynamo M'f'g)	100	75
843	Electrotypers, Electroplating, etc................	25	75

*See Specific Schedule for Class.

NO.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
844	Elevator Car Manuf'y Metal......	100	50
845	" " " Wood....................	150	50
846	Elevators, Grain, Large Steam Power (Grain Ele.)..	125	25
847	" " Small " "	75	25
848	" " " Horse Power (Grain see 995)	75	25
849	" Floating (see Floating Elevators)........		
850	Embossing Note Paper (see Paper Emb.)...........	15	85
851	" on Ribbons..........................	15	85
852	Embroidery work, with power.....................	25	75
853	Emery Wheel Manuf'y,..........	150	100
853a	Emery Mills..		
854	Enameled Metal Goods M'f'y*Bath tubs, Kettles, &c.	100	50
855	" Cloth "	200	100
856	" Jewelry "	75	75
857	Engine (Fire) Hose and Fire Patrol Houses..........	......	25
858	" Steam, Manuf'y.........................	50	25
859	" " Fire Manuf'y........................	50	35
860	Engravers, Wood.................................	......	75
861	" Metal................................	......	75
862	Envelope Manufacturers, with printing............	50	75
863	" " no "	25	75
864	" Stocks....................	10	65
865	Essential Oils, Stocks of........................	5	70
	Evaporators (see Fruit Evaporators, 942)...........	200	150
866	Excelsior Manuf'y...............................	300	200
866a	Extracts, Manuf'y of..........................		
867	Express Offices...	10	40
868	" Stables, (see Stables)....................	50	75
	Eyes, Artificial Stocks of (see Artificial Eyes, No. 427)	.....	75
869	Fair Ground Buildings...........................	200	100
870	Fancy Goods, stocks of........................	20	80
*871	FARM PROPERTY—OCCUPIED BY OWNER.........		
872	" " Dwellings—Brick or Stone—Metal, Slate or Gravel roof.....		
873	" " " Brick or Stone—Shingle roof...............		
874	" " " Frame—Metal, Slate or Gravel Roof....		
875	" " " Frame—Shingle roof..		
*876	" " Barns and contents, insured with dwelling on same premises..		
*877	" " OCCUPIED BY TENANT..........		
878	" " Dwellings—Brick or Stone—Metal, Slate or Gravel roof,....		
879	" " " Brick or Stone—Shingle roof,.................		
880	" " " Frame—Metal, Slate or Gravel roof, ...		
*881	" " " Frame—Shingle roof,.		
882	" " Barns and contents, insured with dwelling on same premises,..		
	" " OUT BUILDINGS.....		
883	" " Corn in Cribs,....................		
884	" " Grain, in stack in field,..........		
885	" " " Growing,†................		
886	" " Hay in stack near Farm buildings,.		
887	" " " " over 500 feet from bdgs	......	500
888	" " Live stock, Horses, Cattle, Sheep, Hogs, (SeeLive Stock No. 1155)..		

*See Specific Schedule for Class. †With limit per acre form of policy.

*At present we use only these numbers for Farm Dwellings and Barns and contents.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents
	Feathers and Flowers, Stocks of (see Artificial 429).	......	100
889	" cleaning, renovating, etc.	25	100
890	Feed Store Stocks, without Hay or Straw.	10	50
891	" " " with Hay and Straw in bales.	25	50
892	Felt Mills*.	50	50
893	Felting Goods, Stocks of.	......	50
894	" " Manuf'y, Shoes, Slippers, &c.	50	100
895	Fences, Privies, Out-houses of dwellings, &c., 50 cts.		
896	Ferry Boats, Steam Power. 75 "		
897	" Houses.	25	25
898	Fertilizers Manuf'y* (see also Phosphate Mills).	200	100
899	" " from city garbage (see No., 776)	300	100
900	" Phosphates, Stocks of.	......	45
901	" Fish, blood or Animal matter†.	300	100
902	File Manufacturers.	25	60
903	Fire-arms, Ammunition Stocks, Cutlery, Fishing Tackle, etc.	10	50
904	" Manuf'y (see Guns and Pistols).	50	50
	Add for any exposure, Wood-working Hazard No. 1663, Boiler R. No. 527, Japanning No. 1087,		
	Fire Engine Houses (see Engine Houses, No., 857).	......	25
905	Fire-proof Safes Manuf'y (see Safe Manuf'y).	50	50
906	" " Stocks of, (see Safes).	.....	40
907	Fireworks, fire-crackers and torpedoes only. Increase rate on the building and stocks with which they are kept 15 cents per $100 per month being short rates of 75 cents per annum.		
908	" assorted stocks, other than fire-crackers and torpedoes, 50 cents per $100 per month		
909	" with Manuf'g. Set Pieces.	600	400
910	Fish Dealers, with Lobster Boiler.	15	60
911	" " without Lobster Boiler.	......	60
912	" dried, salted, &c. (see Warehouse, 2286).		
913	Fishing Tackle Manuf'y (see Firearms, etc., stocks (No. 903).	10	50
	Fixtures and Furniture, Office and Store (see No. 957)	......	20
	Flags and Banners, Stocks of, (See Banners No. 467)	......	85
	Flat Houses (see Apartment Houses 421, 422).		
914	Flaxseed and Linseed, in packages.	. . ..	70
915	Flax Mills*.	150	150
	Floating Elevators (see 849). 4 %		
	" Derricks and Cranes (see 796). 3 %		
917	Floor Cloth (Oil, Linoleum, Corticine) Manuf'y*.	300	100
918	Florists' Stocks, in stores.	10	140
919	" " " Green and Hot-houses.	100	200
920	Flour, in barrels.	......	25
921	" " bags.	......	35
922	" and Produce (see Feed, 891).	25	50
923 b	" Mills, Brick or Stone, Steam Power, Roller process		
924 b	" " " " " " Stone process		
	" " " " Water P. see next page.		

*See Specific Schedule for Class. †Liable to Spontaneous Combustion

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate.	Add for cont'nts Rate.
	Flour Mills, continued.	Cents.	Cents.
925 b	Flour Mills, Brick or Stone, Water Power Roller process		
926 b	" " " " " " Stone process		
923 f	" " Frame, Steam Power, Roller process...		
924 f	" " " " " Stone " ...		
925 f	" " " Water " Roller process...		
926 f	" " " " " Stone " ...		
930 a	Food, Patent, Manuf'y		
	Forts, (see Military Stations)........................		
	Foundry, Brass (see Brass Foundry).(see 555).......	40	35
932	" Iron (see also Stove Foundry, 1513).......	50	50
933	" Type....................................	25	100
934	Frame Rows, not exceeding 4 buildings............		
935	" " " " " Stocks in,..		
936	" " exceeding 4 buildings..		
937	" " " " Stocks in,.......		
	Frames (see Picture Frames)......................	50	100
938	Fringe and Trimming Manuf'y (see also 485).......	50	75
	Fringes, Cords, Gimps and Tassels, etc., Stocks of.. See Buttons and Trim. 602.	.....	75
	Fruit Canning (see Canning Factory, No. 614).......	150	50
	" Dealers. See 944 and 945....................		
942	" Evaporators and Driers,..................	200	150
943	" " " by Fire Heat.........	250	150
944	Fruits, Retail, Stocks of..........................	.....	50
945	" Wholesale, Stocks of......................	10	50
	If ripening Bananas, Gas-heat,..............	25	100
	" " " other than Gas-heat,....	50	100
946	Fulling Mills.....................................	50	50
	Furnaces, Iron, (See Iron Furnaces, Blast Fur. 1081)		
947	Furnishing Goods, Men's..........................	......	50
	Furniture, Cabinetware. with finishing and upholstering (see Cabinet, No. 604)...	50	75
	" " without finishing or upholstering (see Cabinet, No. 603)	25	75
948	" Household and Pictures, Private Storage (see also H. F.).	40	85
949	" " in mercantile or office building	.....	30
950	" " Second Hand, for sale (see 1437)	100	200
951 b	" " in brick dw'g, slate or metal r'f		
951 f	" " " frame " " "		
952 b	" " " brick dwelling, shingle roof		
925 f	" " " frame " " "		
953	" " " Apartment Houses(421c)...	.....	25
954	" Manuf'y,* Steam Power (see Cabinet, 604) Add for any exposure by Boiler R. No. 527, Painting Hazard, No. 1267, Drying, No. 814).	300	100
955	" Manuf'y, Water Power.................	200	100
956	" Polish Manuf'y (see Varnish)............	200	150
957	" and Fixtures, Office and Store (see Fixtures	......	20
958	Furs and Peltries, in unbroken packages...........	......	35
959	" " cutting and sewing..............	5	60
960	" " without sewing.................	......	50
961	" Hats and Caps, Stocks of (see Hats and Caps)..	......	60
962	" Hatters', Manuf'y of..............................	200	100

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY. continued	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
963	Fuse Factories	150	100
964	Galvanizing	25	50
	Garbage Crematories, (See Crematories, 776)	300	50
	" Fertilizer Manuf'y. (see Fert. M'f'g. No. 899)		
965	Gas Fixtures, Lamps and Chandeliers, Stocks of	10	50
966	" " Manuf'y. with Mach. Shop and F'dry.	50	75
967	" Meter Manuf'y	50	75
968	" Works ... 1 %		
	Gasolene Soldering Pots—Not over 5 gallons of material, in safety cans, inside of building, remainder of supply outside entirely cut off, add 25 cts.		
	General Merchandise (see Nos. 1195 and 810)		
	Gents' Furnishing Goods (see Furnishing Goods, 947)	......	50
970	Gilding (see Picture Frames)	30	95
971	" paper, books, etc	25	50
	Gins, (See Cotton Gins, 755, 756),		
	Glass and China Decorating, Kiln &c., (See 665,)		
972	" Blowers, Ornamental, with Furnace	75	50
973	" Etching, Sand blast, &c	50	50
974	" Factories*	100	50
975	" Glassware and Window Glass, in packages wholesale	5	55
976	" Ornamental, Stained, Leaded, &c	......	75
977	" Plate, Grinding and Polishing	15	60
978	" Silvered plates	5	70
979	Glazing and Painting	50	50
980	Gloves, Buckskin, Manuf'y,	50	50
	" Boxing, Manuf'y (see Boxing G. No. 544)	50	75
981	" Kid "	25	75
982	" " Stocks of	......	75
983	" other than kid, stocks of	......	55
985	Glucose Manuf'y	150	100
986	Glue Manuf'y	200	100
987	Glycerine Manuf'y	125	75
988	Gold and Silver Platers	25	65
989	" Beaters	15	60
	" Refiners (see Assayers 439)	20	55
991	" Pen Stocks	......	25
992	" " Manuf'y	25	50
	Goods on storage (see Warehouses and 1800, etc.)		
	Gossamer, Cutting and Making Garments, no Cement (Same as Clothing)		
993	Grain in Elevator, large, Steam Power,		
994	" " " small, " "	......	25
995	" " " " Horse "		
	" " Field, Standing (See 885),		
	" " Stack, (See 884),	......	
996	" " Stores or Warehouses, Brick, no Elevator	......	25
997	" " " " with "	25	25
998	" " " Frame, no "	......	25
999	" " " " with "	50	25
1000	" " Granary on Farm,	.....	25

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
1001	Grand Stands on Race Tracks, Fair Grounds, 350 cts.		
1002	Granite Workers, Sawing, Polishing, Carving......	5	50
1003	Grape Juice Unfermented, Manuf'y................	25	75
	Graphite works, (See Lead Black, No. 1123),.......		
	Grease, Axle (see Axle Grease, No. 449),...........	25	50
1004	" Rendering, (no nuisances).................	150	100
1005	Green Houses (see also Florists, 919),...............	100	200
	Grinding, Cutlery (see Cutlery Grinding, No. 785)...	25	75
1006	Grist Mills....................................	100	50
1007	Groceries, Retail...........	10	40
1008	" " Chinese.........................	20	40
1009	" Wholesale, without spice and coffee grinding....................	......	40
1010	" " with spice and coffee grinding	15	50
1011	Guano (see Fertilizers)..............................	......	30
	Gun and Pistol Manuf'y, (See Fire Arms, 904),.....	50	50
	Guns, Pistols, Fishing Tackle, Stocks (see F. No. 903),	10	50
1012	Gunsmiths and Locksmiths.........................	10	50
	Guttapercha, (See India Rubber, Crude, No. 1067)..	......	15
1013	Gymnasiums..................	5	45
1014	Hair Cloth Manuf'y.............................	50	75
1015	" Goods (Human).............................	.....	75
1015 a	" Curled, Manuf'y of...........................		
1016	Halls, with scenery, (see Theatre Schedule).........		
1017	" without scenery, ceiling uniform height over stage and auditorium, Dancing, Lyceum, etc.	15	35
	" City, Town or State, No. 1500...............		
1018	" Society, Lodges, Masonic, Odd Fellows, &c...	10	40
1019	Hammock Weaving, not over 10 hands (if over 10, add 1 ct. for every 5 additional hands)	50	75
1020	Hardware Manuf'y..............................	50	75
1021	" Stocks of, (not exceeding 5 bbls. oils).....	10	55
1022	" without oils...........	5	55
1023	" " " heavy, bar iron, etc. (see Iron and Warehouse Schedule)....	.....	40
1024	Harness and Saddlery Stores, no Collar Manuf'g....	5	45
1025	" " " with Collar Stuffing...	50	75
1026	" " Manuf'y no Collar Stuffing....	25	75
1027	" " " with " "	50	100
	Hats and Caps Manuf'y less than 100 hands, No. 615.	20	80
	" " " if more than 100 hands, add 1 ct. to each column for every 5 additional men, but total rate not to exceed (No. 616)	50	100
1028	" " Stocks, Wholesale (other than straw)	......	40
1029	" " retail.......................	......	60
	" " Bonnet Frame Manuf'y (No. 532)...........	50	50
	" " " Bleaching (see Bonnet B. No., 533)..	50	100
1030	" Block Manuf'y..............................	50	100
1031	" Silk, Manuf'y..............................	40	85
	" Straw (No. 617)...........................	40	60
	Hatters' Furs Manuf'y, (see Furs, No. 962)...	200	100
	Hay and Feed (see Feed Stores, No. 890)............	25	50
1033	" " Straw Presses, private, on farms.........	125	50
	" " " " See next Page.		

*See Specific Schedule for Class.

	WHOLESALE GROCERIES OCCUPANCY CHARGES*	Add for Build'g Rate.	Add for Contents Rate.
		Cents	Cents
1009	CLASS A. **GROCERIES.—WHOLESALE.**		
	Without manufacturing or any of the additional hazards specified below	......	40
	CLASS B.		
	If bottling wines, liquors, olive oil, blueing, or other preparations, with packing	10	40
	CLASS C.		
	If mixing and packing flour, starch, baking powder, cereals or similar substances; Or if printing	15	45
	CLASS D.		
	If manufacturing flavoring extracts, essences or drugs; Or if rectifying by cold process only; Or if molasses reboiling or maple syrup mixing; Or if coffee milling, polishing, separating, mixing, and grinding, with power; Or if fruit cleaning with power or dry room, or bleaching with sulphur	30	50
	CLASS E.		
	Or if coffee roasting, using only gas fuel standard equipment, fire proof floors, metal cooling pans, metal troughs, metal conveyors, and metal hoods over roasters; Or if spice grinding with modern iron frame mills.	40	60
	CLASS F.		
	If coffee roasting, standard equipment, using other than gas fuel	50	70
	CLASS G.		
	If spice grinding with wooden frame mills	75	75
	CLASS H.		
	If coffee roasting, old style equipment, wooden floors, wooden cooling troughs, or wooden con veyors	1.25	1.10
	*Charges are not cumulative. The higher rate in each case includes the less.		

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate.	Add for cont'nts Rate.
	Hay and Straw, continued.	Cents.	Cents.
1034	Hay and Straw Barns or Presses public, near R. R. &c. Add for steam power, 150 to both columns.	200	100
	" " " in Stacks, on Farms (see No. 886, 887)		
1035	" " " " " near Mills (Mill rate)......		
	" Barns, insured with d'wg, (See Farm, No. 882).		
1036	" Barges..............................200 cts.		
1037	" on Barges...........................300 "		
1038	Heliotype Printing—Gelatine......................	50	100
1039	Hemp and Jute Mills*............................	100	200
1040	" in bales....................................	50	75
1041	Henneries.....................................	50	100
1042	Herbs, Stocks for Sale (see Warehouse, No., 2402)...	25	125
1043	Hides and Skins................................	......	25
1044	Hollow-ware, Metal, Manuf'y....................	25	50
1045	" " Castings, Stoves, etc. Stocks of,	10	40
1046	Hominy Mills..................................	100	75
1047	Hop Houses....................................	125	125
1048	Hops in bales.................................	10	115
1049	Horn Goods, Manuf'y (see Comb Manuf'y, 729)......	40	60
	Horse Cars in H. Car Stables, (see Cars, No. 626)....	200	100
	Horse Car Stables (No. 623)......................		
	Hose and Belting Manuf'y, (See Belting No. 494)....		
	" " " India Rubber (see India Rubber Manuf'y, No. 1072		
1050	Hosiery and Knitting Mills, no Picking or Carding..	25	50
1051	" " " " with Picking and Spin'ng	50	50
1052	" " Knit Goods, Stocks of................	......	50
1053	Hospitals, for Non-contagious Diseases............	25	25
1054	" " Contagious Diseases, Pest Houses &c.	300	100
1055	Hotels, City, (see Hotel Schedule)................	75	50
1056	" " Frame..................................	75	50
1057	" stocks on grade floors (see various stocks)....		
1058	" Country Cross-roads Taverns,..............	25	50
1059	" Season,* Summer Resorts, etc.,............	150	50
1059a	House Boats, Pleasure Barges, etc................		
	Hot houses (see Green-houses, 919, 1005)...........	100	200
1060	House Furnishing Goods, Stocks of................	15	60
	Household Furniture. Private Storage (see No. 948)..	40	85
	" " in Mercantile or Office Build'g (see Furniture, No., 949). ...	......	30
1061	Hub and Spoke Manuf'y (see Wheel 1641)..........	150	150
1062	Ice, Artificial, Manuf'y.........................	50	100
1063	" Cream Manufactury.........................	15	60
1064	" Houses (Brewery)...........................	50	100
1065	" " Ice for sale or shipping..............	100	100
	Imitation Leather Manuf'y (see Leather, No. 1134)..		
1066	Incubators....................................	100	150
1067	India Rubber, Crude (see Guttapercha)............	......	15
	" " Boots and Shoes, in cases (see 541)....	......	30
1068	" " Goods, retail stocks................	5	40
1069	" " " wholesale, belting, etc........	......	30
1070	" " " If rubber cement is kept in quantity exceeding one gallon in tin cans.....................	25	75
	" " " See next page.		

*See Specific Schedule for class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate.	Add for cont'nts Rate.
	India Rubber Goods, continued.	Cents.	Cents.
	India Rubber Goods, If oil clothing kept (the clothing hung with air spaces for ventilation)	15	45
1072	" " " Manuf'y*, Hard	150	50
1073	" " " " Soft	200	100
1074	Ink Manuf'y, Printers,' no oil boiling	75	75
1075	" " " with oil boiling	100	75
1076	" " Writing	50	50
	Insane Asylums (see Asylums, No. 441)		
1077	Instrument Makers, optical, mathematical, surgical, etc., with manufacturing	15	110
1078	" " Stock, no manufacturing	......	75
	Iron and Steel, Tubing and Pipes, (see Heavy H. 1023)	......	40
1079	" Architectural, Works	25	50
	" Foundry (see Foundry, No. 932)	50	50
1081	" Furnaces (see Furnaces and Blast F.)	50	50
1082	" Pipe Manuf'y (see Pipe)	25	50
1083	" Railing Manuf'y	50	50
1084	" Workers, not elsewhere specified	75	50
1085	Ivory, Stocks of, with turning, carving, etc., no wood-working	10	35
	" Vegetable, (see Vegetable Ivory, No. 1611)	150	150
1086	Jails	50	25
	Japanese and Chinese Goods, Stocks of (see No. 667)	10	80
1087	Japanning Works	150	150
	N. B. Small oven, safely arranged, used in manufacturing risks as a mere incident of the process add 50 cents to both columns of the rate of the risk.		
1088	Jewelers' Findings and Supplies, no Manuf'g	......	50
1089	Jewelry-Case Manufacturers	30	70
1090	Jewelry Manufactory, less than 25 hands	25	50
1091	" " 25 to 50 hands	30	50
1092	" " over 50 hands, add one cent to each column for every five additional men, but total rate not to exceed	40	60
	" in safes (see No. 690)		
	" Watches and Clocks, retail stocks, (see 688)	......	50
	" " " wholesale (see 689)	......	50
1093	Joiners' Shops, Ship	100	100
1094	Junk Stores	100	200
1095	Jute, in bales	75	75
1096	" Mats, Stocks of	25	75
	" Mills (see 1039)	100	200
	Kerosene Oil, 5 barrels, without charge in groceries and lamp stocks		
1098	" " exceeding 5 barrels, special rates according to quantity (see Oils)	200	100
1099	" " Refinery (see Oils)	300	200
	Kid Gloves (see Gloves, No., 981)		
1100	Kilns, Malt, Oatmeal, Grain, etc. Where any woodwork is used in the framing of the kiln, whether claimed to be safely protected by brick or terra cotta or not	200	100
1101	" If the kilns throughout are of incombustible material	25	100

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
1102	Kindling Wood Factory, no Pitching..............	200	100
1103	" " " with "	250	100
	Knit Goods Manufacturing (see Hosiery, No. 1050)..		
	" " Stocks, (see Hosiery and K., No., 1052).	......	50
	Laboratories, Chemical (see Chemical L. No., 662)..	60	65
1104	Laces and Embroidery Stocks....................	......	75
1105	" " Manuf'y....................	25	75
1106	Ladder Manuf'y (rung ladders)..................	100	50
1107	" " Step, "	150	100
1108	Ladies' Waists Manuf'y.........................	25	100
1109	Lager Beer Saloons (see also Saloons)..............	5	45
1110	Lamp-black Manuf'y (see Animal Black, No., 419, Bone-black, No., 529)........	300	300
1111	Lamp Manuf'y, Glass and Metal..................	50	75
	Lamps, Chandeliers, etc., Stocks of, (see Gas Fix. 965)	10	50
1113	Lantern, Metal and Glass, Manuf'y................	50	75
1114	" Paper, Manuf'y........................	100	75
1115	Lapidaries.....................................	10	50
1116	Lard Oil Refinery*.............................	150	100
1117	" " Stocks of.............................	50	100
1118	" Stocks of (see Provisions)..................	20	40
1119	Last Manuf'y...................................	50	50
	Laughing Gas (see Dentists' Gas, No. 794)..........		
1120	Laundries, Small, Handpower, Chinese, etc.........	25	100
1121	" Steam power.........................	50	100
1122	Lead Pencil Manuf'y............................	50	50
	Add for exposure of Boiler Room Hazard, No., 527, Dry Room Hazard, No., 814.............		
1123	" Black or Graphite Works....................	100	100
1124	" Pipe and Sheet Lead Manuf'y..................	30	45
1125	Leather, Stocks of, kinds not specified.............	......	55
	" Bags (see Bags, No. 452 and Pocket Books).		
1126	" Belting, Stocks of..........................	......	50
	" " Manuf'y, (See Belting, No. 494)....		
1127	" Board, Stocks of...........................	10	90
1128	" " Manuf'y...........................	75	100
1129	" Lace Manuf'y...............................		
1130	" Fancy Leather, and Morocco, Shagreen, Patent, General Shoe Finding Stock, Tanned Kids, Tanned Sheep Skins, General Stock of Untanned Calf, Goat and Sheep Skins, Fancy Skins for Tanning, Alligator, Snake.......	......	50
1131	" for Belting, Leather in Hides or Sides, Kips, Rough Leather and Sole Leather..........	......	25
1132	" Glove, Finished............................	......	55
	" Goods (see Harness, Bags, &c.).............		
1133	" Grain Leather, Harness Leather, Split Leather, Tanned Calf Skins, and Upper Leather, Lace Leather in rolls...............	......	40
1134	" Imitation, Manuf'y.........................	100	100
1135	" Ornamental, Manuf'y.......................	10	60
1136	" Scraps, Shavings and Skivings.............	50	75
1137	" Stays, Manuf'y............................	10	60
1138	" Sole, with cutting.........................	5	30
1139	" Upper and Findings.......................	......	50

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
1140	Libraries Circulating....................................	......	75
1141	" Public..............................	.....	50
1142	Lighters, Sail..............................100 cts.		
1143	" Steam..............................125 cts.		
1144	Lightning Rod Manuf'y...........................	50	75
1145	" " Stocks of.........................	......	75
	Lime, Cement, Plaster, Sand and Hair. Masons' and Builders' Material (See 584).		
1145a	Lime Kilns...		
1146	Liniment Manuf'y, (see Patent Med. M'f'y, No. 1284)	75	100
	Linoleum Manuf'y (See Floor Cloth, No. 917).......		
1147	Linseed Oil Mills*..............................	150	150
1148	Liquors, retail, (see Saloons, No., 1419, 1420)........	25	75
1149	" Storage, (not sale) in Barrels and Cases....	25	50
1150	" wholesale, without rectifying.............	25	50
1151	" " with rectifying, cold process...	35	60
	" " " " hot process (see 1393)		
1152	Lithographing....................................	50	100
1153	Livery Stables, Brick (see also No. 1493)...........	125	50
1154	" " Frame..........	125	50
1155	LIVE STOCK, HORSES, CATTLE, SHEEP, HOGS.......		

If the policy contains the following clause, 25% may be deducted from rate of the amount covering live stock

"The amount payable on any one animal in case of loss shall be the sum produced by dividing the total amount insured upon the class to which the animal belongs by the total number of animals in the class owned by the assured and in no case exceeding the actual cash value of the animal."

For example, $1,000 insured on horses would mean that $100 could be collected on any one if there were ten; $200 on any one if there were five.

N. B.—Such phraseology as "$500 on five horses" would not prevent a claim of $500 on any one, even though there were twenty. Nor would the additional words "not exceeding $100 on any one" mend the matter, except to prevent claim for more than that amount on any one. The policy would still be faulty in that it might be covering a much larger number of animals than five and a larger value than $500. In case any five animals should be killed by lightning or burned, the claim would be that the identical five were the ones insured. No rate on live stock, especially on such animals as cattle, sheep, &c., running at large in fields, could be relied upon without some such clause as the above; nor would the number of animals on the farm at the time of writing the insurance be any guarantee that the number at risk would not have been largely increased at the time of a fire. A small amount of insurance on a large herd of cattle, would entail severe loss to the underwriter in the

" " See next page.

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate.	Add for cont'nts Rate.
	Live Stock, continued.	Cents.	Cents.
	course of a five-year term from lightning claims alone, especially in a wire fence country.		
1156	" " HIGH PRICED ANIMALS, BLOODED STALLIONS, JACKS, RACE HORSES, BROOD MARES, ETC....................150 cts.		
	The concentrated value within the space of a horse stall, of an exceptionally valuable animal, subject to total loss by the effect of fire or smoke on a single vital organ, the suffocation of a single pair of lungs, for example, is a feature which should not be lost sight of in the rate. Five thousand dollars insurance on 50 animals where the loss on any one could not exceed $100 is a much better risk with respect to probabilities of salvage than $5,000 insurance on a single horse.		
	With a certain class of owners, also, a serious moral hazard may arise from a slight injury to a valuable animal reducing its salable value possibly 90 %.		
	In the case of breeding, racing and training stables, the stable rules should prohibit the use of matches, kerosene oil lanterns, &c., &c. It would be a simple matter, also, to protect each valuable animal by a cheap sprinkler plant, as a single sprinkler head over a stall might serve to extinguish match fires. Probably the most fruitful causes of fires in stables are dropped matches, the animals igniting them with their feet.		
	Animals above or below the grade floor should be charged for at the rate of 10 cents added for each floor above or below the grade.		
1157	Lock Factory..................................	50	75
1158	Locksmiths and Gunsmiths (see Gunsmiths).........	10	50
1159	Locomotive Works.............................	50	25
	" Round Houses (see Rail Road)..........	25	25
	Lodge Rooms, Masonic, Odd Fellows, etc. (see Mason) (No. 1018)	10	45
1161	Lodging Houses, no Kitchen..........................	10	30
1162	" " with "	15	35
1163	Looking-Glass and Mirror Manuf'y................	75	100
1164	" " " Picture Frames, Stocks, etc. (see Frames).....................	50	100
1165	Lumber, Storage, new material..................	50	50
1166	" Yards, near Saw and Planing Mills...		
1167	" " not " " " "		
1168	" " small, detached..................		
	Lunatic Asylums (see Asylums, No. 441)..........		
1169	Macaroni Factory, Vermicelli, &c.................	50	100
1170	Machinery, Stocks, delicate, with fine parts subject to damage, ring travelers (used in mills) card clothing, needles, &c.....	......	100
1171	" Stocks of heavy.......................	......	40
1172	" Contractor, with power................	25	50
1173	Machine Shop,* with forge, no Pattern Making, under 10 hands...................... ...	25	40
	" See next page.		

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate.	Add for cont'nts Rate.
	Machine Shop, continued.	Cents.	Cents.
1174	Machine Shop with Pattern Making, over 10 hands, add 1 cent for every 5 hands in excess of 10...	40	40
1175	" " fine work subject to damage......	25	100
1176	Mackintosh Manuf'y......	50	100
1177	Malt Houses, fire-proof kilns......	50	75
1178	" " not " " but cut off......	75	75
1179	Mantels, Manuf'y, Metal or Stone......	25	75
1180	" " Wood,......	75	100
1181	" Stocks of Metal or Stone......	......	75
1182	" " " Wood......	25	100
1183	Map Mounting and Varnishing......	50	100
1184	Marble, Onyx, &c., Stocks of......	......	50
1185	" Worker, Steam Sawing, Carving and Polishing	15	55
1186	" " hand carving......	.....	75
1187	Market, large public......	25	25
1188	" Retail, Green Grocers (see Butcher Shops)..	......	45
	Masonic Lodges (see Lodges, No. 1160)......	10	45
1189	Massage Establishments, with Baths......	25	60
1190	Match Manuf'y......	200	200
	Mathematical and Optical Instruments (see Instr'm'ts)		
1191	Matting (floor) Manuf'y......	75	100
1192	Mattress Making, Hair only, no Picker......	50	100
1193	" " other than hair, no Picker......	100	100
1194	" " " " " with "	200	100
	Medicines, Patent, Stocks of (see Patent M. No. 1283)	50	100
	" " Manuf'y (see 1284, 1285)	75	100
1195	Merchandise (see Dry Goods & Remarks, U. M. S. p. 35)		
	" in Warehouses (see Warehouses)......		
	Merchant Tailors (see Tailor, No. 1528)......	......	50
	Merry-go-rounds (see Carousels, No., 630)......	100	100
1196	Metal Dealers......	......	40
1197	" Workers, not elsewhere specified (see Iron, 1084)	75	50
1198	Metals, heavy exclusively, Pig, Bar, Ingot......	......	20
1199	Mica, with over 10 hands, sorting, &c......	5	15
1200	Military Goods, Stocks of......	......	100
1201	" " Manuf'y......	50	100
1202	" Stations, Forts, Gov't Barracks......	200	100
1203	Milk Depots, Butter, &c......	......	50
1204	" Condensed, Manuf'y......	25	100
1205	Millinery, Stocks of......	......	75
1206	" with manufacturing, (no power)......	10	75
1207	" " " with power......	25	75
1208	Mill Supplies, Stocks......	50	75
1208 a	" " Manuf'y......		
1209	Mineral Water Establishments, Bottling......	5	45
1210	" " Manuf'y......	25	50
1211	Mince Meat Manuf'y......	10	65
1211 a	Molasses, Reboiling......		
	Mixed Stocks (see No. 810 and p. 35, U. M. S.)......		
1212	Morocco Dressers......	100	100
1213	" Manuf'y......	200	200
1214	Moulding, Wood, M'f'y (same as Planing Mill, 1323)		
1215	" Picture Manuf'y " " " " ...		
1216	" " Stocks of......	50	100
1217	Mucilage and Paste Manuf'y......	50	100

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
1218	Museums, no Scenery	25	250
1219	" with Scenery	100	250
1220	Musical Instruments, Pianos, Organs, Melodeons.	....	100
1221	" " string and wind	.....	100
1222	Music Stores	......	100
1223	Mustard Mills	150	100
1224	Nail Manuf'y	50	100
	Naphtha, less than 2 bbls., add 25 cents to rate of building and stock		
	" more than 2 bbls., special rates and separate storage	400	200
1227	Natural Gas or Oil Wells Fixtures, &c., decline		
1228	Naval Stores, Tar, Rosin, &c	75	75
1229	Navy Yard Buildings	100	50
1230	Necktie Factory	25	125
1231	Needle Manuf'y	50	125
1232	Negatives, Photographic (see Photo. No. 1301)	......	200
1233	News Dealers	10	90
	Newspaper Printing Offices (see Printing, No. 1356).	50	75
1234	" Advertising Agency	10	90
1235	Nickel-Plating Establishments (see Electro. No. 843).	25	50
	Nitrate of Soda (see 1422 and Warehouse, No. 2619).		
1236	Notions, Stocks of	......	100
	Nut and Bolt Works (see Bolt and N. W'ks, No. 528)	125	75
1237	Oakum, Stocks of, in bales	50	100
1238	" Manuf'y	150	100
1239	Oat Meal Mills	200	100
	Odd Fellows Lodges (see Lodges, No. 1160)	10	45
	Offices (see also Cotton Brokers)	......	25
1240	" buildings exclusively for (see 173, 207 U.M.S.)		
" a	Office Furniture and Fixtures in office b'd'gs (see 957)	......	20
	Oil and Paint Stores, retail (see Paint and Oil, 1262).		
	" " " Wholesale (No. 1264)		
1241	" Currier's, with pressing	50	50
	" Essential (see Essential, No., 865)	5	70
1242	" Fish Manuf'y	100	50
1243	" Heavy, Lubricating, with Grease	25	50
1244	" " with Mixing	50	50
	" Kerosene or Petroleum, in bbls. (see 1098)	200	100
1245	" " " " in Iron Tanks	100	100
	" " " " Refineries (see 1099)	300	200
	" Mills (see Linseed, Cottonseed, Lard Oil, &c).		
1246	" Petroleum products, Benzine, Naphtha, &c. (see No. 1226)	400	200
1247	" Stove, Gas Stove and Gasoline Stove Manuf'y	50	50
1248	Oilcloths, Stocks of	......	50
	Oilcloth Manuf'y (see Floor Cloth No. 917)	300	100
1250	Oiled Clothing Manuf'y	150	150
1251	" " Stocks, hung for ventilation	100	100
1252	Oleomargarine Manuf'y	100	50
	Opera Houses (see Theatres, No. 1547)	175	175
	Optical and Mathematical Instruments (see Inst. 1078)		
1255	Organ and Piano Manuf'y	150	150

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
	Organs in Churches (see also Churches, No. 676)	......	75
1256	" Stocks of (see Musical Instruments)	.....	100
1257	Overalls, Manuf'y	25	75
	Oyster packing (see Canning, No. 614)		
	Packing Box Manuf'y (see Box Manuf'y, No., 549)		
	Pail Manuf'y (see Bucket Manuf'y, No. 580, 581, 582)		
1258	Paint and Color Works, Water Colors	50	75
1259	" " " Oil "	100	100
1260	" " " Benzine Paints	200	100
1261	" Manuf'y, Mixing	100	100
1262	" and Oil Stores, retail	50	100
1263	" Dry Colors, Stocks of	20	55
1264	" Wholesale, in cans. No Oils drawn. If Oils drawn add 75 cents.	20	40
1265	Painter, House	50	75
1266	" Sign	40	60
	Painting Hazard in Manufacturing Risks no benzine or naphtha used, add to rate of risk	50	50
	" Benzine or Naphtha used, add to rate of risk	100	100
	Panoramas and Cycloramas (see Cyclo. No. 787)	50	150
	Paper Bags Manuf'y (see Bag Factories, No. 453)	25	75
1269	" Boat "	50	100
	" Box Manufactories (see Box, 546, 547)		
	" Car Wheel " (see Car Wheel, No. 629)	75	50
	" Embossing Note (see Embossing, No., 850)	15	85
	" Hanging Manuf'y (see Wall Paper, No. 1621)	125	125
	" " Stocks (see Wall P., No. 1622)	......	100
1270	" Mills*, using mixed rags,	150	50
1271	" " " White " exclusively*	50	50
1272	" " " Straw, Jute, Rope, &c	250	100
1273	" " " Wood Pulp	75	100
	" Pail Manuf'y (see Bucket, No. 581)	75	50
	" Patterns, Stocks of (see Patterns, No. 1287)	......	150
1274	" Rulers	15	60
1275	" Stocks of, wholesale (no rags or scraps)	5	70
1276	" " " with cutting and gilding	20	65
1278	" " " no cutting	15	60
1279	" " " with wrapping and twine	15	60
1280	" " " Rags and scraps in bales, no sorting or baling (see Rags)	15	65
1281	" " " with Rag sorting and baling	75	125
	Parasols (see Umbrellas and Parasols 1599)		
	Passementerie, bead work (see Bead Work, No. 485)	......	75
	Paste Manuf'y (see No. 1217)		
1282	Patent Leather Manuf'y	200	150
1283	" Medicines, Stocks (see Medicine Pat.)	50	100
1284	" " Manuf'y, power and heat	75	100
1285	" " " cold process, few hands	25	100
1286	Patterns, Dress, Paper, Manuf'y	25	150
1287	" " " Stocks of	.....	150
1288	" Shoe, Manuf'y (see Shoe P.)	50	100
1289	" Wood, "	100	75
1290	Pawn Brokers	15	70
1291	Peanut Factories	100	100

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
1292	Pearl Goods Manufactory. No Vegetable Ivory..	10	65
1293	Peg, Shoe, Skewer, and Toothpick Manuf'y.......	100	100
	Pencil, Lead, Manuf'y (see Lead Pencil, No. 1122)..		
	Penitentiaries and State Prisons (see Prisons, No. 1359)	100	100
	" " Workshops, No. 1360	200	100
	Pen Manuf'y, Gold (see Gold Pens, No. 992)........	25	50
1294	" " Steel..............................	50	100
1295	Perfumery Manuf'y, cold process................	25	100
1296	" Stores,............................	10	65
	Periodical Dealers (see also News Dealers, 1233).....	10	90
1297	Phosphate Mills................................	175	75
1298	Photo Engraving, Process Work..................	25	75
1299	" " with wet plate, electrotyping, &c.	50	100
1300	Photographers, Stock, Supplies and Fixtures, exclude Dry Plates..........................	10	90
	" on Negatives (see No. 1232).........	......	200
1302	" " Dry plates.....................	......	300
1303	" Supplies, Manuf'y of..............	25	100
1304	Piano Manuf'y (see Organ and P. Manuf'y, 1255)....	150	150
1305	Pianos and Organs, Stocks of, with repairing,......	50	100
1306	" " " no repairing, (see No. 1222).....	......	100
1307	Pickers, Cotton. Safely arranged, fire-resisting con struction, dust conveyers, casks of water and pails provided.........	100	150
	If sprinkled, deduct 40 %.		
	*" " Fire-proof construction........	50	150
1308	*" Wool. Deduct 25 per cent. from above rates.		
1309	*" Jute, Hemp, Flax, Upholstering material, etc..................................	200	200
1310	Pickle Manuf'y, with soldering..................	50	150
1311	" Stocks of (see Warehouse, No. 2726).........	......	75
1312	Picture Frames, manufacturing, gilding, etc. (see also Frames)........................	30	100
1313	" Stores, no framing, except for own trade....	25	100
1314	Pictures on exhibition or Storage................	......	100
	Pie, Cake, and Bread Bakeries (see Bakeries, No. 458)		
1315	Piers, Wharves and Bulkheads, covered............	50	
1316	" " " " Mdse. thereon	......	125
1317	" " " uncovered..........	25	
1318	" " " " Mdse. thereon	......	100
1319	Pin Manuf'y....................................	50	75
1320	Pipe Cutting (Gas and Steam).....................	25	50
	" Drain and Sewer M'f'y (see Drain Pipe, No. 800).	100	50
	" Iron, Manuf'y (see No. 1082).................	25	50
	Pipes, Meerschaum, Smokers' Articles, etc. (see 1480)	10	75
	Pitch (see Asphalt, No. 438).......................		
1323	Planing Mills, Steam Power......................	250	100
	Charge for exposure of Drying Hazard No. 814, Painting Hazard, 1267, Boiler Room, 527.		
1324	" " Water Power.....................	200	100
	Plants (see Florist, No. 919)......................	......	300
1326	Plaster Works..................................	50	100
1327	" Statuary and Casts......................	20	100

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
1328	Plated Ware, Stocks of	......	75
1329	" " Manuf'y	25	75
1330	Plate (Name) Maker, with plating	25	50
1331	" " Engraving only	10	50
1332	" Printer	25	50
1333	" Electro and Stereotype	......	150
1334	" " " " in vaults	......	10
	" Solid Silver (see No. 1468)		
	Playing Card M'f'g, (see Card No. 621,)		
1335	Plow Manuf'y,* hand power	50	75
1336	" " steam "	100	100
1337	" " water "	25	50
	Add for Painting, 1267, Drying, 814, Boiler R. 527.		
1338	Plumbers' and Gasfitters' Stocks, with handwork	25	50
1339	Plush Manuf'y	50	100
1340	Pocket-books and Leather Bags, Stocks of	......	50
1341	" " " " Manuf'y	50	75
1342	Police Stations	......	25
1343	Policy Shops	25	75
1344	Polishing Materials, Stocks	25	75
	Poorhouses (see Almshouses, No. 415, 416)		
1345	Pork Houses	50	50
1346	" Rendering, Steam Kettle, add 25 cts. " Smoke Rooms, not cut off, add 50 cts.		
1347	Post Offices	......	25
1348	Potteries	100	50
1349	Preserves Manuf'y	50	75
	Print and Color Works (see also Bleacheries, No. 512)	125	75
1350	Printers' Ink, in cans (see Print. Ink Manuf'y, 1074)	10	60
1351	" Roller Manuf'y	50	100
1352	" Supplies, with occasional printing	25	75
1353	Printing, Composing only	15	60
1354	" Foot-power, card and small job printers	15	60
1355	" Gold, with heat	25	75
	" Heliotype (see Heliotype, No. 1038,)	50	100
1356	" Newspaper	50	75
1357	" Solar	10	90
1358	" with power, (steam or electric) 1 large or 3 small presses	40	60
	" add 5 cts., for each large press, up to	75	125
1359	Prisons, State, Penitentiaries, &c., (see Penitentiaries)	100	100
1360	" " " " Workshops	200	100
1361	Provisions, Lard, Produce, Stocks of, no smoking or rendering	5	45
1362	" " " " " if smoking and rendering for own trade	25	50
1362 a	Public Park Buildings		
	Public Halls (see Halls)		
1363	Pulley, wood and Block Mf'y (see Block & P. No. 515)	75	75
1364	Pulp, Paper, Manuf'y of	100	50
1365	" Wood " wet process	150	100
" a	" " " chemical, sulphite process		
	Pumping Stations, see Water Works, 1634		
1366	Pump Manuf'y, Metal	25	50
1367	" " Wood, (see also No. 515)	75	75

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
1368	Quartz and Stamp Mills (see No. 1394)............	100	50
	Queensware (see Crockery)............................		
1369	Quilt Manuf'y, Cotton, &c............................	50	100
1370	" " Down and Feather only............	25	75
1371	Rags, in iron tied bales, no assorting................	10	50
1372	" " rope " " " "	50	75
	" with assorting..................................	50	150
	" Carpet Weaving (see Carpet, hand p. No. 641)	50	50
	Railroad Bridges (see Bridges, No. 563)...........		
1373	" Cars, Dining..................................	100	
1374	" " Freight, box........................	50	
1375	" " " Platform....................	55	
1376	" " Ordinary passenger................	75	
1377	" " Sleepers, Parlor, &c..............	75	
1378	" Depots, Passenger, Brick or Stone.........	50	25
1379	" " " Frame................	60	25
1380	" " Freight, Brick or Stone..........	60	25
1381	" " " Frame..................	70	25
1382	" Locomotives..................................	......	25
1383	" Round Houses..............................	25	25
1384	" Shops..	50	100
1385	" Signal Towers..............................	50	
1386	" Snow Sheds.................................	200	
	" Stables (see Car Stables, No. 623)........		
	" Stations, (See Depots, above).............		
1387	" Property generally—not classified.......		
1388	Rattan Goods, Manuf'y of (see Bamboo, 461)........	75	75
1389	" " Stocks of (" " 462)........	10	65
	Razor Manuf'y (see Cutlery, No. 784)...............	25	100
1391	" Strop Manuf'y..................................	25	75
1392	Rectifying Establishments, cold process (see 1151)..	15	45
1393	" " hot " (" 798)..	200	50
1394	Reduction Works (see Quartz Mills, No. 1368)......	100	50
1395	Refinery, Oil (see Kerosene, No. 1099, Lard, 1116)..	300	200
	" Sugar (see Sugar Refinery, No. 1523).....	300	100
1397	Reform Schools, Houses of Refuge & Reformatories	100	100
	" " " " " Work Shops, No. 1360	200	100
1398	Refrigerators Manuf'y..............................	100	100
1399	" Stocks of, no manuf'g or repairing....	10	50
1400	Regalia, Masonic, Odd Fellows, etc............	.....	65
1401	Restaurants, with cooking..........................	15	70
1402	" no "	10	75
1403	" Railroad..................................	25	75
1404	Rice Mills*...	100	50
1405	Riding Academies, with stable..	50	100
1406	" " without stable.................	25	75
1407	Rinks (see Skating Rinks)...........................	300	100
1408	Rolling Mills..	75	25
1409	Roofing Materials, Stocks of, no boiling of tar, &c..	100	50
	" " Manuf'y, Asphalt, Pitch, &c., 438	300	200
1411	Rope and Cordage, Cables and Twine..............	5	35
1412	" Walks...	150	100
	Rosin, Tar, Naval Stores, &c. (see Naval Stores, 1228)	75	75

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
	Rubber Boot and Shoe Manuf'y (No 1073)..........	200	100
	" Boot & Shoe Stocks, package only (see 541)..	......	30
	" Goods (see India Rubber 1068).............		
	" Manuf'y, Hard Goods (see India Rubber 1072)		
	" " Soft " (" " 1073)		
1413	" Stamp Manuf'y..........................	10	50
1414	Ruches, and Ruffles Manuf'y.....................	15	60
1415	Rule Manuf'y..................................	50	75
	Ruling (Paper) (see Paper Ruler, No. 1274).........	15	60
1416	Rugs, exclusively (see Carpets)..................	......	50
	Saddlery and Harness, no Collar manuf'g (see Harness, No. 1024)............	5	45
	" " Manuf'y (No. 1026)..........		
1417	Saddle-tree Manuf'y...........................	100	100
	Safes, Fireproof, Manuf'y, (see No. 905)...........	50	50
	" Iron, "Fireproof", &c., Stocks of (See 906)..	......	40
1418	Sail and Rigging Manuf'y, lofts, &c. (see Awning)..	10	60
1419	Saloons, Bar-rooms, Alcoholic, "Gin Mills".........	25	75
1420	" High Class.............................	15	75
	" Lager Bier, German type, No. 1109).......	5	45
1421	Salt Blocks or Works..........................	50	100
1422	Saltpetre, in bbls. (see Warehouse, No. 2619)........	75	25
1423	" " sacks (no empty sacks to be stored on premises) (see Warehouse, No. 2621)...	75	50
1424	Sand-paper Manuf'y, with dry room...............	100	100
1425	Sanitaria, Water Cures, &c. (see Water Cure, 1634)..	25	25
	Sash, Door, and Blind Manuf'y (see Blind No. 513)..		
1426	Sausage Manuf'y..............................	75	100
1427	Saw-dust stuffed goods Manuf'y..................	50	100
1428	Saw Factories.................................	75	50
1429	" Mills,* Steam power......................	250	50
1430	" " Water "	150	50
1431	Scales Manuf'y................................	50	50
1432	" Stocks of................................	......	50
1433	School-houses, Brick or Stone....................	10	15
1434	" Frame...........................	10	15
1435	" Small Country....	10	15
	Second-hand Stores, Clothing (see Clothing, No. 701)	100	200
	" " Furniture, (see Furniture 950).	100	200
1438	Seeds, Garden, Stocks of........................	10	115
	Segar Stores, (see Cigars, No. 680, 681)...........		
	Seminaries (see Academies 401)...................		
1439	Sewing Machine Manuf'y.........................	50	75
1440	" Machines, Stocks of......................	5	55
	Shade, Roller, Manuf'y (see Window Shade, No. 1655)	150	100
1442	Shingle Mills..................................	300	100
1443	Ship Builders Yards, &c., wood..................	100	50
1444	" " iron....................	50	50
	" Chandlery (see Chandlery, No. 656)..........	25	60
	" at wharf. (see No. 1615)................100 cts.		
1445	Shirt, Collar and Cuff Manuf'y, without laundry 723	50	75
1446	" " " " with "	75	75
1447	" Stocks of (see Furnishing Goods)............	......	50

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
1448	Shoddy Mills*	250	150
1449	" " with picking	300	200
1450	" Storage	200	150
1451	Shoe and Boot Manuf'y,* Brick, Steam power	75	75
1452	" " " " Water "	50	75
1453	" " " " Hand "	50	50
1454	" " " Frame, Steam "	75	75
1455	" " " " Water "	50	75
1456	" " " " Hand "	50	50
1457	" Manuf'ry in mercantile buildings, in cities, less than 100 hands	40	100
1458	" " If more than 100 hands, add one cent to each column for every five additional men, but total rate not to exceed	50	110
	If rubber cement used by more than 10 hands or oil dressing add 10 cents.		
	" Counter Manuf'y (see No. 768)	100	100
1459	" Dressing, in cans	......	40
1460	" Findings Manuf'y	100	100
1461	" Maker and Cobbler (see No. 715)	10	40
	" Patterns Manuf'y (see Patterns, No. 1288)	50	100
	" Peg Manuf'y (see Peg, No. 1293)		
1462	" Stock, with cutting	40	40
1463	Shooting Galleries	25	75
1464	Shot Tower	250	50
1465	Show Case Manuf'ry, (see Wood-working Schedule).	100	100
	Shuttle and Bobbin Manuf'y (see Bobbin, No. 525)	150	100
1465 a	Silos		
	Sign Painter (see Painter, No. 1266)	40	60
1466	Silk Manuf'y*	30	60
" a	" Stocks of, exclusively (see Dry Goods)	......	60
	Silver and Plated-ware Stocks (see Plated-ware, 1328)	......	75
1468	" Solid	......	40
1469	" Polish Manuf'rs	15	60
1470	Skate Manuf'y	50	100
	Skating Rinks (see Rinks, No. 1407)	300	100
	Skewer and Peg Manuf'y (see Peg Manuf'y, No. 1293)	100	100
	Skin Mills, (see No. 781)		
1471	Slate and Silicate Manuf'y	100	100
1472	Slaughter Houses, large, Abattoirs, no nuisances	200	100
1473	" " small, butcher,	150	50
1474	Sleigh Manuf'y, Driving	150	150
1475	" " Toy	200	150
1476	" Stocks of	10	50
1477	Slipper Manuf'rs	25	75
	Smelters (see Reduction Works, No. 1394)		
1478	Smoke Houses, Public, Pork House, &c	50	75
1479	" " Private	50	50
1480	Smokers' Articles, Stocks of	10	75
" a	" " Manuf'y of	50	75
	Snow Shovels, wooden, Manuf'y, (see No. 1576)		
1481	Snuff Manuf'y	150	150
1482	Soap Manuf'y, Laundry	200	100
1483	" " Toilet	200	150
1483 a	" Powder Manuf'y		
1484	" Stocks of	10	40
1485	Soapstone or Talc Manuf'y	100	50

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
1486	Soda Fountain Manuf'y..................................	50	75
1487	" Water "	40	60
1488	Spice Mills...........	150	200
1489	Spool Manuf'y...................................	150	100
1490	Sponges, Coral and Shells............................	......	50
1491	Sponging (Steam) Works...........................	50	75
	Sporting Goods, Stocks of (see Firearms, etc., 903).	10	50
	" " Manuf'ry (see No. 443)...	100	75
" a	Spring Bed Manuf'y............................	50	50
1492	Stables, Boarding exclusively......................	75	75
	" Car, (see No. 623 etc.)......................		
	" Express (see No. 868)......................	50	75
" a	" Industrial, Brewery, Mills, &c	30	40
1493	" Hotel,.....	125	50
	" Livery, (see No. 1153).....................	125	50
" a	" Mercantile, Grocer's, Baker's, &c..........	30	40
1494	" Private.................................	25	25
1495	" Training...........	75	75
1496	Stair Builders...................................	150	150
1497	" Rod Manuf'y................................	25	50
	Stallions (see Live Stock No. 1156)...............		
	Stamp and Quartz Mills (see Quartz Mills, 1368)....	100	50
	" Rubber, Manuf'y (see No. 1413)............	10	50
1498	Starch Manuf'y, Corn, Cereal, &c.................	100	150
1499	" " Potato.........................	400	100
1500	State Houses, City Halls...............	25	25
1501	Stationers' Supplies, Manuf'y......................	100	100
	Stationery and Book Stores (see Books No. 536).	......	75
1502	Stave and Heading Manuf'y (for Cooper, see 733)....	150	150
1503	Steamboats, Excursion............................2%		
1504	" Laid up†...........................1¼		
1505	" Regular trip boats, A 1 rating......1 %		
	" " " " A 1½ " ....1¼ "		
	" " " " A 2 " ....2 "		
	" " " " A 2½ " ....2½ "		
1506	" River, carrying cotton or naval stores..		
1507	" Tugs, A 1 rating.................... .1 %		
	" " A 1½ " ....1¼ "		
	" " A 2 " ....2 "		
	" " A 2½ " ....2½ "		
1508	" Dredges.................................3		
	" Derricks (see Derricks, No. 796).........1½		
1509	Steam Engines, Fire Engines Stocks of (see Engines)	......	50
1510	" Gauge Manuf'y..................	50	50
1510a	" Heating Plants		
1511	Steel Works, Bessemer, &c.........................	50	50
	Stencil and Rubber Stamp Manuf'y (see No. 1413)..	10	50
1512	Stock-yards, Cattle Pens..................200 cts.		
	Storage Risks (see Warehouse, Nos. 948, 1623, etc.).		
	" high class for personal effects Fur. etc., 948	40	85
1513	Stove Foundry (see Foundry, No. 932)........... .	50	50
	" Manuf'y (see Oil Stove, Gas Stove, No. 1247)	50	50
1513a	Stores, part dwellings..............................		
1514	Stoves, Hollow-ware, Stocks of, no tinshop........	10	40
1515	" " with tinshop, no gasolene......	25	40
1516	" " with tin-shop and gasolene fire-pots	40	60

*See Specific Schedule for Class.

†With stipulations as to proximity

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
1517	Straw Board Mill* (see Paper, No. 1272)	200	100
1518	“ “ Stocks of	5	55
	“ Goods Manuf'y* (see 617)	40	60
1519	“ “ Stocks of Retail	5	70
1520	“ “ Wholesale		60
	Studios, Artists' (see Artists' Studios, No. 436)		
1521	Sugar Houses, on plantations	75	50
1522	“ of Milk Manuf'y	100	100
1523	“ Refinery	300	100
	Surgical Instrument Manuf'y (see Inst. No. 1077)	15	110
1524	Suspender Manuf'y	15	70
1525	Tack Factories	75	75
1526	Tag Manuf'y, Card Board	25	60
1527	“ “ Metal, with acid	15	60
1528	Tailor, Merchant (see Merchant Tailor)		50
1529	“ Custom, with cutting and bushelling		60
1530	“ Trimmings (see No. 602)		75
	Talc Manuf'y (see Soapstone, No. 1485)		
1531	Tanneries, "Back Country"	300	100
1532	“ Bark, in or near Towns	200	100
1533	“ Extract, in or near Towns	125	125
	Tape Weaving (No. 1637)		
1534	Tapestry Weaving by hand		75
1535	Tar Manuf'y	400	100
	Taverns (see Hotels)		
1536	Taxidermist	25	100
1537	Teamsters' Office, with storage of supplies	25	50
	Teas, Coffee, Spices, etc. (see Coffee, 717, 718)		
1538	Telegraph Offices	10	75
1539	“ “ Switchboards		200
1540	Telephone Offices	25	60
1541	“ “ Switchboards		300
1542	“ Manuf'y	150	150
1543	“ Supplies	10	50
1544	Tenement Houses, with brick shafts		
“ a	“ “ without “ “		
1545	“ “ first floor fireproof		
	Tent Makers (see Awning Manuf'y No. 447)	10	60
1546	Terra Cotta Works	150	50
1547	Theatres,* Opera Houses, "Fire-proof" construction	100	175
1548	“ “ not “ “	175	175
	Theatrical Goods (see Costumers, No. 753)	10	90
	Thermometer Manuf'y, No. 1077		
1549	Thread, Cotton and Linen, Stocks		40
1550	“ “ “ Manuf'y*	50	50
1551	“ Silk, Manuf'y	30	60
1552	“ “ Stocks		60
1553	Tiles Manuf'y	100	50
1554	“ Stocks of		60
1555	Tin Shop, 10 hands	15	60
1556	“ “ more than 10 hands	25	75
1557	“ “ with Japanning	50	75
	“ “ See next page.		

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate.	Add for cont'nts Rate.
	Tin Shops, Continued.	Cents.	Cents.
	" " Gasolene Pots, (see 969)........		
1558	" Cans, Stock—no work........	.....	40
1558a	" Plate Manuf'y........		
	Tinware, Stoves, etc. (see Stoves)........		
	Tobacco and Cigars, retail (see Cigars, No. 680).....	5	70
1559	" Barns, Country........	100	150
1560	" Chewing, in foil and boxes........	25	75
1561	" Leaf, Foreign, in hhds., bbls. or cases......	.....	100
1562	" " " in ceroons or bales........	.....	110
1563	" " Domestic in hhds., bbls or cases......	.....	75
1564	" " " " ceroons or bales........	.....	85
1565	" Manufactory, Fine Cut........	150	150
1566	" " Plug........	100	150
1567	" Pipe Factories, Clay........	100	150
1568	" " " Meerschaum........	25	75
1569	" " " Wood, Cob, &c........	100	50
1570	" Plug, (See Warehouse)........	.....	50
1571	" Prize Houses........	200	150
1572	" Stemmeries........	200	150
1573	Toboggan Manuf'y........	150	150
1574	" Slides........	200	
	Tool Manuf'y Edge, (see No. 832)........	50	75
1576	" " Wood........	150	150
	Toothpick Wooden, M'f'y (see Peg and S. No. 1293).	100	100
1577	Tortoise Shell Manuf'y, with heat........	25	125
1578	" " " without heat........	.....	125
	Tow, in bales (see Hemp, No. 1040)........	50	75
	Town Halls (see No. 1500)........	25	25
1580	Toys, Fancy Goods, etc., open stock........	10	115
1581	" " " in p'k'gs, not exceeding 25% open	5	95
	" one man touching up........	20	100
1582	" Manuf'y........	200	150
	Training Stable (see Stable No. 1495,)........		
	Trimmings, Buttons, etc., Stocks of (see Buttons, 602)	.....	75
1583	Tripe Manuf'y........	50	100
1584	Trunks, Manufactory........	150	100
1585	" Stocks of, no manufacturing........	.....	50
1586	" with repairing........	25	60
1587	Truss and Crutch Factory........	50	75
1588	Tub Manuf'y........	150	150
1589	Tug Boats (see No. 1507)........		
	Turkish and Russian Bath Establishments (No. 480).	25	50
	Turning, Ivory (see Ivory No. 1085)........	10	35
1591	" Wood (" Wood Turning)........	125	50
	Turpentine, in bbls. (see 1228)........	75	75
1593	" Distillery........	300	200
	Twines, Cord, Rope, etc., Stocks of (see Rope, 1411)	5	35
	Type Foundries (see Foundry, No. 933)........	25	100
1594	" Stocks of........	.....	100
1595	Type writer Factory........	50	100
1596	" Repairing........	25	100
1597	" Ribbon Manuf'y........	25	125
1598	" Stock, Supplies........	.....	75

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
1599	Umbrellas and Parasols, Manuf'y, covering, no stick work (see C. & U. 611)	25	75
	" " " " with stick work.....	50	75
1600	Undertakers, no work other than finishing for funeral orders..............................	5	45
1601	" with finishing, varnishing, etc., hand work..............................	15	50
1602	Upholsterers' Stocks, without manufacturing......	.....	50
1603	" with manufacturing, 10 hands or less.	15	60
1604	" more than 10 hands, add 1 ct. to first column for every 3 hands in excess of 10		
1605	" using jute, excelsior or grass, add 50 cents to first column........		
1606	" if picker, power, add........100 cents.		
1607	" " " hand " ....25 "		
1608	" Hair only..........................	10	65
1609	Varnish Manuf'y................................	200	200
1610	" Stocks of...............................	50	75
1611	Vegetable Ivory Stocks............................	150	150
1612	Veneers, Manuf'y...............................	150	150
1613	" Stocks of...............................	......	100
1614	Vessels (see also Steamboats)......		
1615	" at Wharves or Piers................100 cts.		
1616	" in port, restrictions as to petroleum or as to lying near oil refinery, oil yard, &c..100 cts.		
1617	" on the ways, repairing, &c..........125 "		
1618	Vinegar, Cider Apple and Fruit, Manuf'y, (677).....	75	75
1619	" (Alcohol Process) "	100	100
	Wadding and Batting M'f'y (see Batting and W. 484)	300	200
1620	Wagon and Cart Manuf'y.................... ...	150	100
1621	Wall Paper Manuf'y (see Paper Hanging Factory)..	125	125
1622	" Stocks of (see Paper Hanging)....... ..	......	100
1623	Warehouses Storage (for cont'nts see Nos. 1800, etc)		
1624	" Country, Brick..........	50	50
1625	" " Frame....	50	50
1626	" Cotton and Woolen Mill.............	50	50
1627	" Flour Mill...........................	50	50
1628	Washing and Wringing Machine Manuf'y..........	200	100
1629	Waste, clean, Cotton..........	100	200
1630	" " Woolen............................	150	200
1631	Watch Case Maker...............................	10	65
1632	" Dial and Face Manuf'y....................	25	75
1633	" Manuf'y.................................	50	50
	Watches, Clocks and Jewelry (see Clocks, No. 688).	......	50
	Water Cures, Sanitaria (see Sanitaria, No. 1425)....	25	25
1634	" Works, Pumping Stations, &c..............	25	100
1635	Wax Factories..........................	100	100
1636	" Figure Makers.	100	150
	Weaving Mills* (see Nos. 759, 1673).............		
1637	" Tape.................................	100	100
	Webbing Manuf'y (see Elastic Goods, No. 836).....	75	100
1638	Whalebone Worker.............................	25	50
1639	Wharf-boats..............................	100	50
	Wharves and Piers (see Piers and Wharves)........		

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate. Cents.	Add for cont'nts Rate. Cents.
1640	Wheelbarrow Manuf'y	200	150
1641	Wheel Manuf'y (Hub and Spoke, No. 1061)	150	150
	Wheelwright & Blacksmith, (See Blacksmith No. 509)	75	50
1642	Whips, Manuf'y of	100	50
	" Stocks of (see Canes, No. 610)	10	50
1643	Whiskey, in barrels, in stores	25	50
1644	" " " " brick warehouses	25	50
1645	" " " " frame† "	25	50
1646	" " " " ironclad "	25	50
1647	" " " stove heat for ageing process	50	
1648	" " " steam " " " "	40	
1649	White Lead Works	200	100
1650	" Goods, Sheetings and Muslins, in cases	......	30
1651	Wig Maker (see Hair Goods No. 1015)	......	75
	Willow-ware and Basket Maker (see Basket No. 478)	50	100
	" " Stocks (see No. 1661)		
1652	Wind-mill Manuf'y, Metal	100	50
1653	" " Wood	250	50
	Window Glass (see Glass No. 975)	5	55
1654	" Shade Manuf'y	100	75
1655	" " Roller and Fixtures, Manuf'y	150	100
1656	" " Stocks	25	75
1657	Wineries, Wine Vaults, &c	25	75
	Wines and Liquors (see Liquors, Nos. 1148, 1150)		
	" " retail, No Bar (see No. 1148)	25	75
1658	Wire and Wire-fence Manuf'y	50	100
1659	" work Manuf'y	25	25
1660	" " and Wire Screen Stocks	5	45
1660 a	" Screen Manuf'y		
	Wood (see Cord Wood)		
1661	" and Willow Ware Stocks	25	100
1662	" Bending Works	200	100
	" Carpet Manuf'y (see Carpet No. 642)	150	100
	" Carving (see Carving, No. 648)	25	125
	" Pulp Manuf'y (see Pulp No. 1365, 1365a)	150	100
	" Turning, (see Turning No. 1591)	125	50
1663	" Workers,* not elsewhere specified, Steam power (Boiler and Dry Room outside)	200	100
1664	" " not elsewhere specified, Steam power (Boiler and Dry Room inside)	600	200
1665	" " not elsewhere specified, Water power	175	75
1666	" " " " " Hand "	150	50
	" Yard and Coal Yard (see Coal and W., No. 714)	100	25
	Wooden Pulleys (see Pulleys, No. 1363)	75	75
1667	" Ware Manuf'y	200	100
1668	Wool, in bales or bags	......	20
1669	" Pulling	250	50
" a	" Scouring		
1670	Woolen Clippings	50	150
1671	" Goods, Cloths, etc., in packages	......	40
1672	" Mills.* First Class, Modern mill construction, Brick or Stone, open finish, no furring on walls or concealed spaces between floors; heavy beams, double flooring;		

†The difference between frame and brick will be measured in the building rate to be added.

*See Specific Schedule for Class.

No.	CHARGES FOR OCCUPANCY, continued.	Add for Build'g Rate.	Add for cont'nts Rate.
	Woolen Mills, continued.	Cents.	Cents.
	staircases, elevators, pickers and drying process cut off—latter by cold air only; using pure wool stock, no shoddy, cotton or mixed stock...........		
1673	Woolen Mills* First Class. Weaving only, buying warps and yarns; no picking or spinning................................		
1674	" " First Class. Using mixed clean cotton stock, no shoddy....................		
1675	" " First Class. Using mixed stock with shoddy.............................		
1676	" " Second Class. Good construction, mill floors not double or with heavy beams; staircases and elevators not cut off, but pickers and dry-rooms separated; using pure wool stock....		
1677	" " Second Class. Using mixed stock or shoddy............................		
1678	" " Third Class. Ordinary construction, plastered ceiling, furred walls, poor fire appliances, old machinery, elevators and staircases not cut off, &c., &c., Decline......................		
1679	" " Frame, Steam power................		
1680	" " " Water "		
	" Waste, (see Waste No, 1630)................	150	200
1681	Worsteds and Fancy Wools, Stocks of..............	.....	35
1682	Wrappers (Ladies') Manuf'y......................	15	70
	Wringing Machine Manuf'y, (see No. 1628)..........		
1683	Yachts, Sail.............................75 cents.		
1684	" Steam or Electric................100 "		
1685	Yeast Manuf'y...........	50	100
	Yankee Notions, (see Notions No. 1236).....	.....	100
1686	Yarns, Cotton and Wool, excluding Jute...........	......	40
1687	Zinc Manuf'y......................................	50	75
	Zylonite Factory, same as Celluloid, No. 649........		

*See Specific Schedule for Class.

INSURANCE OF MERCHANDISE IN WAREHOUSES, PUBLIC STORAGE STORES, ETC.

(With Alphabetical List.)

In view of the fact that most of the losses (over 90% in city warehouses other than fibre, protected by fire departments,) are partial, it follows that the relative susceptibility to damage of the various kinds of contents is vitally important, as it would indicate the relative salvage in case of fire, and that whatever differences exist in the goods before a fire would, unless they are totally destroyed, be found reflected in the differences in salvage after a fire. This fact proves that the rates on the various contents of warehouses should be discriminating, and that where they are not—all merchandise being rated at some average figure, (which must necessarily be a maximum high enough for the most damageable class,)—injustice will be done to those classes on which, by reason of the character of the goods themselves or of the packages which enclose and protect them, the greatest salvage may be expected.

The necessity for a round or average rate for a stock of merchandise in a private store for the sale of merchandise of general character, such as Groceries or Dry Goods, for example, where only small quantities of each class of goods are to be found, does not obtain in a public warehouse, where the entire consignments of a merchant, year in and year out, may be confined to a single line of goods in a uniform kind of package, which he can, just as well as not, specify in his policy.

There is no reason why a merchant having a valuable invoice in a public warehouse, of Raw-Hides or of China Clay or Fullers' Earths in barrels, willing to limit the application of his policy by specific description of the goods and the package protecting them, should pay the same rate as another having Leaf Tobacco or Toys.

No system for rating the miscellaneous contents of warehouses by an average rate and an indefinite form of policy can be either just to all merchants or safe for underwriters. On the one hand, it charges the hazard of undesirable risks to the owners of preferred classes and, on the other, it leaves an insurance company in ignorance, until after a loss, as to whether it has an unduly large line on an exceptionally damageable class of merchandise, or an unduly small line on an exceptionally good class of merchandise. In ignorance of what it may be insuring under some indefinite and general form of policy, it must either unduly restrict its lines to be prudent, or inordinately increase them at the risk of having a heavy loss on a subject of insurance peculiarly susceptible to damage from smoke or water. There may be just as much difference between two different classes of merchandise in the same warehouse, under the protection of a fire department, as between two different manufacturing risks.

Where all kinds of merchandise in a warehouse are insured at an average round rate, there will be temptation either to cut the rates on the more desirable classes or to pay an extra brokerage or commission to secure them at the tariff. Any other system of rating than that which justly measures the hazard of each risk is practically on a par with the scheme of a 99-cent bargain counter, from which few intelligent person select 50-cent articles. If rates are accurately equalized or adjusted there will be no choice between hazards, and the temptation to cut rates or to pay extra brokerages for selection will be almost entirely removed. Even if any competitor should prefer a particular class or stock, his associates, having faith in the adjustment of prices, would not be disturbed by his preferences; they would be as willing to take one risk as another and, therefore, those which he should leave.

The specific rating of the following schedule will relieve the Companies of the trouble to which they are now subjected in order to ascertain what their policies are covering under prevalent, general, blanket forms, such as "Merchandise, hazardous and extra hazardous," &c. If, as in the following tariff, the rates named for these general forms are higher than those for preferred classes specifically insured, it will not be necessary to

investigate. The underwriter can rest assured that the merchant will declare his goods if he has a low-rated stock, and if he does not and asks for the general form of policy, the Company will secure a proper rate and be able to determine its line.

LINES.

The argument has been made that some underwriters would be tempted to take the highest rated risks because they would yield the largest premiums; but this overlooks the fact that a line should be regulated by the rate if the latter is based upon accurate methods of measure. The liability to total or excessive losses on particular risks, and the frequency of fires, etc., which enter into questions of line are measured in the rate, and the rate is, therefore, the best evidence of what a line should be.

For example, if the line of an underwriter on a class of merchandise rating at 25 cents be $20,000, his line on a class rating at 1% should not be over $5,000, and on a class of merchandise rating at 2% should not exceed $2,500. In other words, having fixed the maximum line which he would carry on a non-hazardous risk, the amount of insurance which the premium on such a risk would pay for on a higher rated risk would be the proper line for the greater hazard. In the foregoing illustration, $50, the premium of the maximum line for the minimum hazard, would pay for $5,000 on a 1% risk and only $2,500 on a 2% risk.

An underwriter's line in a particular warehouse therefore, may, be said to be "full" when he has secured the proper premium, graded according to the classes covered, no matter what the amount of the insurance may be. If the rates are properly graded the question of amount insured would not determine his line, which could not be said to be full if he had $15,000 on a 25-cent class, but would be more than full if he had $7,500 on a 1% class. His loss on a $20,000 policy on crude rubber would not be greater than on a $5,000 stock of toys.

Under such a system of rating as is here proposed an underwriter can easily regulate his lines, which must always depend upon the character of the goods covered. *It is the probable amount of loss, and not the actual amount of insurance, which determines what a line should be.*

Thus not only lines, but rates and premiums, would be equal-

ized, and the Company taking a non-hazardous risk at the lower rate would have as much premium as a Company taking the more hazardous risk at the higher rate. There would, therefore, be no inducement to an intelligent underwriter to take the higher rated risk, as he would not secure a larger premium, and a correct system of rating, which properly measured all risks, would practically remove all differences and the temptation to make selection, either by cutting rates or paying extra commissions.

Rules of Warehouse. A reduction in the rate of the warehouse, not exceeding 10%, at No. 127, if the rules of the warehouse exclude other parties than the warehouseman or his employees (ensuring disinterested custody) and provide for the use of covered lights; prohibiting, also, smoking, fires, matches, etc., (see Warehouse Rules, N. Y. Board.)

Arrangement of Merchandise. Where the rules of the warehouse agreed to by the warehouseman require clear alleys from windows and doors so that not only may fires be quickly discovered from the street, but (what is more important still) that water thrown by the fire department may reach all portions of a room, a clear space of three feet between the top of merchandise piles and the ceilings being maintained, the basis or key rate of the warehouse may be reduced ten per cent.

This matter of disposition or arrangement of merchandise on the various floors of a building is a very important feature of the fire hazard. On a well traveled thoroughfare, the discovery of a fire by the passers-by, even in the daytime, may be delayed if the merchandise is piled in front of window openings so as to obstruct the view and prevent water from reaching interior fires.

Rates on Merchandise. To secure the rate named in the following table for stock, the particular MERCHANDISE AND ITS PACKAGE MUST BE DECLARED OR SPECIFIED, and *the policy must not contain any general term, such as "and other merchandise, hazardous and extra hazardous,"* or *"other merchandise not more hazardous."* Where such indefinite phrases are used, the policy not being limited in its application to the particular goods for which the rate is specified, the rate for general merchandise must be charged; (see Merchandise," No. 2693.) Thus, if the application of the policy is limited to

Crude Rubber, specifically insured, the addition to the rate of the building will be 10 cents—that named for Crude Rubber No. 2203, but if the wording of the policy is "Crude Rubber and other merchandise, hazardous and extra hazardous," or "merchandise principally Crude Rubber," the figure should be that for "Merchandise," No. 2693.

POISONS.

To secure the separation from other merchandise of such substances as Arsenic, Paris Green, Asafœtida, &c., &c., which would poison or injure food stocks; and of acids, fibre and other ignitible and combustible substances, it is only necessary to charge higher rates, as has been done in the following table, where they are stored with other goods, and a lower rate, sufficient to measure their own probabilities of damage, where they are separately stored with goods only of like kind. The warehouseman, even with a desire to keep his agreement, might not succeed in excluding poisons; but if these were rated, as in the following table, at double the rates of separate storage, they would naturally seek such separate storage.

Specific Counter Tariffs. In a city having a system or large number of warehouses, a specific "counter tariff" may easily be arranged and printed, which will save computation upon each risk. In this tariff a specific basis or "key" rate for each warehouse can be determined and printed, showing the net figure, to which the charge to obtain the stock rate is to be added. In this basis or key rate the deduction of one-fourth of the deficiencies of the building, as explained at No. 128 of U. M. S., may be made which will save deducting it from each stock in the list; it making no difference, of course, since the two have to be added—the key rate of the building and the second column charge of the stock to get the stock rate—whether the deduction be made from the key rate of the warehouse, which would be equivalent to deducting from every stock in the warehouse, or from each stock charge before adding it to the key-rate. The charges for the stocks in the second column of the table can be added to the printed basis rate of the particular warehouse to get the proper rate for any stock in it.

The "ignitibility" and "combustibility" features of hazardous goods admitted to the warehouse can be provided for, as to their

effect upon other stocks, by increasing the key-rate according to a stipulation on the part of the storekeeper as to what merchandise he will exclude, notably such as fibre, chemicals, ethers, etc. This will determine the grade of the warehouse, for *fixing the basis or key-rate for all contents* and save adding the excess hazard of all other stocks to the one to be rated.

The third feature of each stock—the susceptibility to damage—is the only one included in the following table.

The following illustration will serve to further explain the matter. Let us suppose that the unoccupied rate of a warehouse, No. 127 of the Schedule is, say, 45 cents; this would be, under the Universal Schedule, the basis for rating any stock. To it would be added the excess in the first column of the most hazardous stock over that of the stock to be rated and, in addition, the second column charge for the stock to be rated, first deducting therefrom one-fourth of the deficiencies of the building, after which the sum total would be reduced by such percentage deductions as the risk would be entitled to for proximity to hydrants, city fire department, extra steamers, water-towers, etc., (see U. M. S. rating slip.) Instead of making all these computations necessary for each stock in the warehouse, a uniform key-rate can be fixed for all stocks in it, by taking the rate No. 127 of the Schedule, increasing it for the occupancy hazard (according to the agreement of the warehouseman as to whether he will exclude fibre, chemicals, etc.,) then deducting one-fourth of the deficiences of the building and, further, such percentages for proximity to hydrants, extra steamers, water-tower, etc., as the building may be entitled to, the result being, let us suppose, 24 cents. This will be the uniform *key-rate of the warehouse*, to which is to be added the second column charge of the following table to obtain the rate of any class of merchandise contained in it.

For example, suppose the basis or key-rate of the warehouse of John Doe to be 25 cents, the net rate for Boots and Shoes in cases in the following tariff, No. 1995, being 25 cents, the rate for Boots and Shoes in John Doe's warehouse would be 50 cents. In Richard Roe's warehouse, the basis rate of which is 40 cents, it would be 40+25=65 cents.

A SHORTER METHOD.

How to use the following table and to determine the key-rate of any warehouse.

Compute the rate of any staple stock by the Universal Mercantile Schedule—boots and shoes in cases, No. 359, for example—in the warehouse to be rated, deducting, at No. 127 of the Schedule, 10% for warehouse occupancy, and adding the first column charge of the most hazardous stock admitted to the warehouse under the agreement with the warehouseman. From the rate so obtained for the boot and shoe stock deduct the charge for this same stock in the second column of the following table (No. 1995.) The remainder or difference will be the key or basis rate of the warehouse—a figure to which can be added the rate named in the second column of the following table for any other stock to ascertain the rate of such stock in the warehouse.

For example, if boots and shoes in warehouse "A," at Albany, N. Y., would pay 45 cents under the U. M. S., deduct 25 cents, (the rate for Boots and Shoes, No. 1995, in the following Warehouse Schedule) and 20 cents will be the key-rate of the warehouse, to which 30 cents added would give the rate for carpets in the warehouse (20+30) 50 cents; 45 cents added would give the rate for hardware in the warehouse (45+20) 65 cents; 10 cents added would give the rate for crude rubber (20+10) 30 cents.

As already stated, each of the warehouses of a city may thus have its key-rate determined and printed in an alphabetical list, when the following table for stocks, showing the relative susceptibility to damage feature will answer for such warehouse.

AVERAGE RATE OF THE FOLLOWING SCHEDULE.

In order to determine what would be the average rate of premium obtained on the total merchandise contents of a warehouse computed according to the specific rates of the following schedule on the distribution of actual quantities of merchandise of the various kinds, a computation was made upon the basis of merchandise imports for the year 1892 at the port of New York. The total values of merchandise imports for the year were $536,538,112. Of this amount, $382,569,516 was for staples

divided as per the following list. The remaining $153,968,596 represents the value of miscellaneous goods, which would rate somewhat higher as an average by the schedule. The premium computation on the actual values of each of the staple articles named was made according to the rates fixed in the following Warehouse Schedule for the class, taking 25 cents as the basis or key-rate of a warehouse, which would be the average key-rate of the majority of the New York warehouses under the U. M. S.*

The table on the following page shows that on staples like coffee, teas, tobacco, &c., taking the actual values of each,—a total value of $382,569,516—the premium resulting would be $2,232,799. Calculating the rate according to the tariff rate of the New York Board, 60 cents flat for all contents, the premium resulting would be $2,295,417, showing that the premium obtained in this largest warehouse system of the country according to the following schedule would be almost identically the same as that obtained at the round rate of 60 cents fixed by the New York Board. Without claiming that this coincidence is either significant or remarkable, it is certainly interesting. The round rate of 60 cents is the result of the combined expert judgment of the underwriters familiar with the largest warehouse system of the country, and the specific rates of the various classes also indicate their views as to the relative susceptibility to damage of each class.

It may be claimed that if the round rate of 60 cents for merchandise generally, without specification, would secure practically and more easily the same premium, little is to be gained by entailing upon underwriters the extra work of specifiying merchandise, package and rate. But this claim overlooks the fact, first, that a round rate which may be twice or thrice the amount needed for such classes as crude rubber, pig lead, metal goods, boots and shoes in cases, etc., and grossly inadequate for such damageable stocks as leaf tobacco, millinery, feathers, chemicals, toys, etc., tempts underwriters to cut rates for the preferable classes, or to pay extravagant brokerage to secure selection; second, that the underwriter cannot know what he is insuring

*In the case of a warehouse of inferior construction, or in a city with less efficient fire department than that of New York, the key-rate of the warehouse under the U. M. S. would of course be higher.

and, consequently, cannot regulate his line; and, third; and most important, that it ignores the rights of those merchants who own the less damageable property. There can be little claim to fairness in a system of rating which charges to one set of merchants the insurance burthen or tax which should be borne by others.

Imports of Leading Articles of Merchandise.

Port of New York, for a single year.

Article.	Value.	Schedule rate for class including 25 cts. key-rate of building.	Premium.
Sugar	$ 47,848,769.	65 cts.	$ 311,017.
Molasses	505,517.	50 cts.	2,525.
Tea	10,081,372.	60 cts.	60,487.
Coffee	112,662,499.	55 cts.	619,643.
Wool Goods, Mfd	29,791,209.	50 cts.	148,956.
Silk " "	27,761,306.	85 cts.	235,971.
Cotton " "	21,337,770.	50 cts.	106,688.
Flax " "	18,043,684.	50 cts.	90,218.
Hides and Skins	18,715,491.	45 cts.	84,219.
Tin, block etc	7,978,627.	40 cts.	31,914.
" plate	5,000,173.	65 cts.	32,500,
India Rubber and Gutta Percha	18,533,343.	35 cts.	64.866.
Leather and Mfrs of L.	8,804,653.	55 cts.	48,425.
Tobacco, Leaf	7,423,141.	85 cts.	63,096.
" Mfd	1,509,808.	75 cts.	11,322.
Precious Stones	11,288,275.	85 cts.	95,949.
Silks, Raw	8,925,938.	55 cts.	49,092.
Wool	6,331,821.	40 cts.	25,327.
Wines	6,842,574.	85 cts.	58,161.
Furs and Mfrs. of Furs.	6,068,245.	80 cts.	48,548.
China, Stone & Earthen Ware	4,745,825.	60 cts.	28,474.
Furs and Fur Skins Undressed	2,369,476.	65 cts.	15,401.
	$382,569,516.		$2,232,799.
	$382,569,516.	60 cts.	$2,295,417.
All other articles, exclusive of coin and bullion.	$153,968,596.		
Total Imports,	$536,538,112.		

OPERATION OF THE WAREHOUSE SCHEDULE.

(LIST CORRECTED TO JANUARY 1903.)

The following list has been enlarged over former editions, as the result of applications of New York merchants, from time to time, for specific rates on classes of merchandise not before enumerated in the schedule. They are the result of more than a year of successful operation of the Warehouse Schedule in that city, and the list with these additions may be regarded as reasonably complete.

Under the operation of the Schedule the warehouse system of New York has been materially improved. Buildings have been altered by the correction of faults of construction and management. Drugs and chemicals of a poisonous or nauseous character have been excluded from what are termed the Stipulated Warehouses, and also those of an explosive character, some of which are harmless when segregated and properly handled, but dangerous in combination with organic substances like sugar, sawdust, etc.—potassium chlorate, for example, as explained on pages 395, 396 and 397.

Where the following stipulation "A" was signed by the warehouseman a low rate was made for the key or base rate of his warehouse, nothing being added for ignitibility or combustibility; only the susceptibility charge being added to the key or base rate of the warehouse to get the merchandise rate, and the warehouses whose owners signed this stipulation are known as "Stipulated Warehouses."

All other ("non-stipulated") warehouses pay 30 cents* higher base rate, except in the case of chemical warehouses, whose owners sign stipulation "B," agreeing to comply with its requirements. On these warehouses the base rates are increased 15 cents.* (See Stipulation "B".)

*20 cts. and 10 cts. net in N. Y., after deductions for its Fire Department, extra steamers, water towers, &c.

It will be observed that, under this scheme, there are two influences at work to keep objectionable merchandise out of food stock warehouses, viz., first, a high rate for the goods themselves when stored in such warehouses, as contrasted with a lower rate when stored elsewhere and in warehouses of proper conditions; and, second, a higher base rate for a "Stipulated Warehouse" whose owner permits the storage of poisonous or explosive substances. Thus, the owner of drugs and chemicals would naturally seek a non-stipulated or chemical warehouse to get the lower rate, as the warehouseman of the Stipulated Warehouse would naturally decline to accept merchandise which would immediately raise the rate of everything else in his warehouse.

The plan works admirably, and New York underwriters are no longer apprehensive that a fire in a warehouse containing sugar, flour, tea, coffee or other food stocks would result in a total loss on these stocks because of the leakage from poisonous substances, which would cause their condemnation by the Board of Health.

It is, perhaps, well to call attention again to the necessity of using the exact phraseology of the list when insuring any merchandise, as a general form would otherwise be used to cover higher rated merchandise. It is not allowable, therefore, for instance, to insure "linens" where "linen" is intended. The word "linens" might be claimed to include tablecloths, doilies, napkins, handkerchiefs, etc., for which higher rates are named in the list. It is not uncommon to find tablecloths manufactured expressly for individuals, with monograms, etc., of an expensive character. One wealthy lady in New York, having a fad for fancy linen, has two tablecloths which cost $2,000 apiece, made by hand and elaborately decorated with lace, etc. In order that linen merchants, therefore, might not have to pay so high a rate on the general class of goods kept by them as would be needed to cover such valuable articles a special form has been provided, which excepts linen exceeding in value two dollars per square yard, which will be found in the list of forms.

The word "goods," it may be unnecessary again to state, must not be used.

ILLUSTRATION.

It will be observed that the first column charge, i. e., that

which measures ignitibility and combustibility, is omitted in the following table. This charge being included in the base rate.

Let us conceive of three separate warehouses, all of superior construction and built exactly alike, and all rating, without any occupancy charge for ignitibility and combustibility, at a "base rate" of 20 cents. One warehouse is set aside for merchandise of a character which *does not add any charge for occupancy*; such, for example, as flour, tea, coffee, calicoes, silks, etc., which we will call Warehouse "X," whose owner signs the stipulation "A."

Warehouse "Y" accepts all kinds of merchandise and will sign no stipulation whatever. The addition to the warehouse rate to get the base rate for all merchandise in this warehouse will be 30 cents, making the base rate 50 cents.

The third Warehouse "Z" will take all kinds of merchandise, but the owner stipulates (Form B) to segregate according to the pledge (B,) with separating fire walls, etc., and restrictions of arrangement, and handling, all those chemicals which, in combination with others, would result in explosive or self-igniting compounds or which would poison food stocks or bleach colored stocks. In view of such stipulations the addition for ignitibility and combustibility is 15 cents, making the base rate 35 cents.

We would then have three warehouses with base rates as follows:

"X"	"Stipulated"	20 cents.
"Y"	Non-Stipulated	50 "
"Z"	Stipulated Chemical Warehouse	35 "

To these base rates it will only be necessary to add the "susceptibility" charge in the accompanying tables to secure the rate of any merchandise named therein. As objectionable merchandise, poisons, etc., are rated high in a "Stipulated" warehouse and at lower rates in a "Non-Stipulated" or in a "Stipulated Chemical" Warehouse, the tendency would naturally be for owners of such merchandise to seek the "Non-Stipulated" or "Chemical" warehouses since the addition of the base rate to the charge for the merchandise would result in a rate much lower than in the "Stipulated" warehouse. For example, flour in bbls. in "X" would be 20 cents + 25, = 45 cents; in "Y"

50 + 25, = 75 cents; in "Z" 30 + 25, = 55 cents. Arsenic, which is only slightly more susceptible to damage than flour for insurance purposes, but would endanger other merchandise, would be 145 in "X" (with the further effect if the warehouseman should accept it, of immediately raising the base rate of "X," to 50 cents, making 175.) In "Y" it would be 50 + 30, = 80 cents, and in "Z" 35 + 30, = 65 cents. The owner of arsenic would, therefore, naturally seek the cheaper warehouse to get a lower rate, and if he did not, the warehouseman would reject it, knowing that it would raise the base rate of his warehouse and, therefore, the rate of all other merchandise stored with him and prevent his getting the larger values of the more insurable classes.

The following illustration will further explain the operation of this plan and its beneficial effect in keeping out of food warehouses those poisonous substances which when stored with food stocks render underwriters continually liable to total losses on classes of merchandise which, but for such dangerous combinations, would be desirable subjects for insurance at low rates.

W. H. "X" "Stipulated." Base Rate 20c.*	W. H. "Y" "Non-Stipulated." Base Rate 50c.*	W. H. "Z" "Chemical." Base Rate 35c.*

	In "X"	In "Y"	In "Z"
Tea,	20+ 35= 55	50+35= 85	35+35=70
Coffee,	20+ 30= 50	50+30= 80	35+30=65
Flour,	20+ 25= 45	50+25= 75	35+25=60
Arsenic,	20+125=145	50+30= 80	35+30=65
Potassium Nitrate,	20+125=145	50+50=100	35+50=85

It will be observed that, while arsenic becomes cheaper in "Y" and "Z" than in "X," flour becomes dearer, its danger in these warehouses being measured, however, by their increased "base rate." It is not likely underwriters would insure flour in "Y" or "Z" even at the higher rates.

The owner of warehouse "X" cannot afford to allow poisons in his warehouse, as it would immediately raise his base rate,

*In the New York Exchange these base rates are shown on the cards in the cabinets known as "card rates."

and he would lose the storage, in consequence, of ninety-nine per cent in value of the goods in his custody, whose owners could not afford to insure with him at the higher base rate. Tea, coffee, and flour ought to seek (and naturally would, to get a low rate) warehouse "X," but if they should go into "Y" or "Z" they would pay enough higher rate to cover the hazard of miscellaneous storage. Before this plan of insuring warehouses went into operation in New York, they were insured at a low and inadequate rate no matter where or how stored.

When is taken into account that the value of those classes of merchandise which are not objectionable because of any deleterious, poisonous, explosive or bleaching properties stored in the warehouse system of New York in a single year (*vide* the annual statistics of the Port) is over five hundred and twenty millions of dollars, and that not over four millions of dollars in value, *or less than one per cent of this amount*, is of an objectionable character, it will be apparent how senseless, from an economic viewpoint, is the utterly unnecessary, mixed storage of such enormous values for purposes of insurance. It necessitates a high (but inadequate) rate on the 516 millions of non-hazardous merchandise because of such miscellaneous storage, in order to consider the convenience of owners of say four millions whose premiums distributed among all the insurance companies would amount to a bagatelle for each. All of the warehouse systems of the country, those of the larger cities especially, should be treated by underwriters on this plan which has worked so satisfactorily in New York.

State legislatures and municipalities should enact regulations which would prevent these unnecessary and dangerous combinations. In default of a special law of this character the King of Belgium issued in September last, a royal decree, compelling dealers in poisonous drugs and substances to store such articles apart and keep them separated from food supplies. He requires that poisonous substances should be delivered in receptacles or wrappers of such nature that their contents cannot escape, and strict provisions for registering each sale of poisons are made. The decree went into effect in January, 1903.

It seems deplorable that a great nation should be behind a petty kingdom in taking such obviously wise precautions in the interest of citizens.

As I write, February 9th, 1903, word comes of the death of Chief Foley of Milwaukee and four of his men from inhaling the fumes of nitric acid at a fire, enforcing the importance of safe storage and handling of acids and other chemicals. The fact that firemen are naturally deterred from entering buildings containing such substances to fight a fire is alone a reason for charging higher rates aside from the danger of ignition, combustibility, poisonous and explosive properties, which increase the fire loss. It is, perhaps, natural but unreasonable that dealers in these substances should wish them stored in low rated warehouses where non-hazardous merchandise is stored, but underwriters should be firm in excluding from "Stipulated" warehouses all dangerous or even doubtful goods.

"A"

FOR "STIPULATED WAREHOUSES."

STIPULATION FOR WAREHOUSEMAN.

I hereby agree, in consideration of a reduced rate for insurance on merchandise in my Warehouse No........................ ....Street, that I will not knowingly accept for storage, or permit to be stored in said warehouse, any of the following classes of merchandise or chemicals, and I agree to observe due diligence, by inquiry and investigation, to exclude all such merchandise from my said warehouse, and to notify the New York Fire Insurance Exchange of any attempt on the part of owners to store such merchandise in my said warehouse:

Acids, Ammonia, Arsenic or other Poisons, Asafoetida, Benzine or Benzole, Bleaching Powders, Bone Ash, Brimstone, Broom Corn, Calcium Carbide, Carbon (Bi-Sulphide-of,) Cotton, Creosote, Ethers, Explosives, Fibre (Vegetable, Esparto Grass, Excelsior, Flax, Hemp, Jute, Manilla, Moss, Oakum, Sisal Grass, Tampico, Tow, Hay or Straw,) Formaldehyde, Fulminates of Silver or Mercury, Gasolene, Kerosene, Junk, Jute Butts, Lamp-Black, Lime, Metallic Sodium and Potassium, Methyllic Alcohol, Naphtha, Nitrate of Soda, Nitrate of Potassium or other Nitrates, Nitro-Benzole, Paris Green, Petroleum or Petroleum Products, Permanganate of Potash, Phosphorus, Potassium Chlorate, Potassium Cyanide or Nitrate, Chlorate of Soda or other Chlorates, Quicklime, Rags, Saltpetre, Shoddy,

Spirits of Nitre, Sulphur, Turpentine, or Naval Stores, Varnishes or Lacquers, Waste, Zinc Dust.

....

....

"B"

STIPULATION FOR PREFERRED CHEMICAL WAREHOUSE.

I hereby agree, in consideration of a reduced rate for insurance in my Warehouse No....................................
Street, that I will store separately from all other merchandise each of the following chemicals or merchandise, maintaining such separation, each from the other, and from all other merchandise, by a substantial brick wall not less than twelve inches in thickness, without doors or other openings and extending through and above the roof, viz:

Acids, Brimstone or Sulphur, Ethers or any Explosives, Naval Stores, Turpentine, Nitre Cake, Nitrate of Soda, Nitrate of Potassium or other Nitrates, Phosphorus, Chlorate of Soda, Chlorate of Potassium or other Chlorates, Saltpetre, Varnishes and Lacquers, Cotton or other fibre.

I further agree that I will not permit any person in such compartments for handling such chemicals or merchandise who is not thoroughly qualified by knowledge of their dangerous properties to carefully handle them. And I further agree that I will not accept for storage any food stocks, merchandise or substance used for food.

I also further agree to store all poisonous chemicals, such as Arsenic and Paris Green, below the second story of the warehouse, and to store any roots or herbs above such second floor, where water thrown by the Fire Department cannot pass from such poisons to such roots or herbs, in order to minimize as far as possible the loss or damage consequent upon fire.

....

....

N. B. The following table is intended exclusively for merchandise in public warehouses or storage stores.

Rule. Add to the BASE RATE of the warehouse the figure named in the following table for the merchandise to be insured. In no case shall more than five items as numbered in Alphabetical List be insured under one amount, and in such case the rate of the highest must be charged.

The **policy must specify the merchandise by name and describe the package** if the rate sought is that for a particular kind of package; thus on "Liquor in bottles" "Liquor in barrels" "Flour in barrels" or "Opium in tin lined cases".

In case the assured does not know the nature of his package, or does not wish to specify it as, for example, where he may have part in one kind of package and part in another, the merchandise may be insured without specification of package *if the rate for highest rated package be taken.* For example, in the case of Ale, Beer or Porter (No. 1846) the package need not be specified if the highest rate for any package be taken; in this case, that for bottled ale, 40 cents, as contrasted with barreled ale, 30 cents.

It will be observed that rates for general classes, such as Seeds, Gums, Roots, Dried Fruits, etc., are higher than for some specific kinds if specifically insured, such as Gum Copal, Gum Cutch, Flax Seed, Anise Seed, Chicory, Dried Peaches, etc.

N. B.—For Approved General Forms see end.

No.	MERCHANDISE IN WAREHOUSES.	Add to Base rate. Cents.
1800	ACIDS, Acetic,	50
1802	" Arsenious,	100*
1803	" " if stored in Non-Stip. or Chem. W. H. †	50*
1806	" Benzoic,	50
1807	" Boracic,	50
1808	" Carbolic,	100*
1809	" " if stored in Non-Stip. or Chem. W. H,	50*
1810	" Citric,	50
1811	" Muriatic,	100*
1812	" " if stored in Non-Stip. or Chem. W. H,	50*
1813	" Nitric,	100*
1814	" " if stored in Non Stip. or Chem. W. H,	50*
1815	" Oxalic,	100*
1816	" " if stored in Non-Stip. or Chem. W. H,	50*
1817	" Picric,	100*
1818	" " if stored in Non-Stip. or Chem. W. H,	50*
1819	" Sulphuric, (Oil of Vitriol)	100*
1820	" " " " if Non-Stip. or Chem. W. H,	50*
1821	" Tartaric,	50
1822	" (not specified),	100*
1823	" " " if stored in Non-Stip. or Chem. W. H,	50*

*Also increases "base rate" of a stipulated W. H., if stored therein.

†Sulphuric, Nitric and Muriatic Acids and ethers should not be stored with other merchandise; and all acids, ethers, poisons, drugs, asafœtida &c., should be kept away from Food Stocks, Flour, Tea, Coffee, Provisions, Cereals &c.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
1830	Aconite, root or leaves,	45
1831	Advertising Boards,	50
1832	" Matter, Almanacs, Calendars, Letter Heads, Circulars, Pamphlets, Cards, framed and unframed, not salable by reason of being printed with names for specific parties	75
1833	" Matter, salable, without names,	50
	" Show Cards, (see Show Cards, No. 3080,)	
	Aerated Waters in bottles, (see Mineral Waters),	
	" " " bbls. or hhds, " "	
1834	Agate and enameled hollow ware,	20
1835	Agates, Marbles and Onyx (see Marbles,)	30
1836	Agricultural Implements or parts, (see Plows,)	50
1837	" " Hand Tools, only	40
1838	" " If Steel or other metal exclusively such as Scythes, Mower or Reaper Knives, Planing Machine Knives,	50
1839	Aigrettes, if written as "Feathers and Bird Skins for Millinery," (No. 2306)	68
1840	Alabaster,	30
1841	" goods,	60
1842	Albumen,	50
1843	" Egg,	48
1844	Albums,	75
1845	Alcohol,	70
1846	Ale, Beer or Porter, (bottled) in cases,	40
1847	" " " " in hhds. or barrels,	30
1848	Alizarine,	40
	Allspice, (See Pimento, No. 2912,)	
1849	Almonds, in bags, frails, or bales,	45
1850	" in boxes, casks, or barrels,	35
1851	Aloes,	45
1852	" in tin lined cases,	35
1853	Alum,	35
	" Chrome, (see Chrome Alum),	
1854	Aluminum, (metal,)	15
1855	Amazona Bark,	38
1856	Amber,	35
1857	Amid,	48
1858	Ambergris,	125
1859	Ammonia, Aqua,	100*
1860	" " if stored Non-Stip. or Chem. W. H.	40
1861	" Carbonate of,	96

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
1862	Ammonia, Molybdate of,	100*
1863	" " " if stored in Non-Stip. or Chem. W. H.	40
1864	" Phosphate,	24
1865	" Sulphate of,	96*
1866	" " " if stored in Non-Stip. or Chem. W. H.	40
1867	Ammoniac, Sal, (See Sal. Am.,)	25
1868	Ammunition, fixed, (see also Cartridges, No. 2081,).	60
1869	Anilines,	50
1870	Anchors,	5
1871	Angelica Root,	50
1872	Angora Worsted Yarn,	24
1873	Anise Seed,	50
1874	Aniline Salts,	120
1874½	" Oil	120*
	" " if stored in Non-Stip. or Chem. W. H.	48
1875	Annatto,	50
1876	Antimonial Lead,	10
1877	Antimony,	100*
1878	" if stored in Non-Stip. or Chem. W. H.	40
1879	" Metal	14
	" Sulphate, (see Sulph. of A. No. 1865)	
1880	Antiquities, Antiques, Curios and Bric-a-Brac,	100
1881	Anvils,	5
1882	Apples,	50
1883	" Dried,	40
1884	Apricots, Dried,	38
1885	" Kernels, (see Nut Kernels or Shelled Nuts)	60
1886	Arabian Hair Sheep Skins, Kangaroo and Marsupial, (see Kangaroo),	34
1887	Argols, (crude Cream of Tartar,)	35
1888	Arnica Flowers,	50
1889	Arrow Root,	40
1890	Arsenic,	125*
1891	" if stored in Non-Stip. or Chem. W. H.	30
1892	Artificial Eyes,	50
1893	" Feathers,	72
1894	" Flowers,	75
1895	" Limbs,	60
1896	" Silk Yarn, (see Silk Yarn 3373),	58
1897	" Teeth,	35
1898	Artists' or Photo materials, Dry plates excluded	75
1899	Artistic Burnt Work on Wood and Leather,	72

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
1900	Art-works, (see Bronzes, Antiques, Statuary, etc.,)..	100
1901	Asafœtida, (should not be stored with food stocks,).	100*
1902	" if stored in Non-Stip. or Chem. W. H...	40
1903	Asbestos,..	10
1904	Asphaltum,..	100
1905	Astrachan Cloth, (see Dress Cloth),................	28
1906	Athletic Goods, (see Sporting Goods, No. 3146),....	50
1907	Atlas Preservatives,.....	160
1908	Autographic Sales Registers,......................	50
1909	Automobiles and Accessories,......................	72
1910	Awnings and Awning Frames, Tents,..............	50
1911	Axle Grease,..	50
1912	Babbitt Metal and Solder,.........................	20
1913	Bacon,..	30
1914	Bagging, made of flax, hemp or jute,...............	37
1915	" cotton cloth for.......................	25
1916	Bags, Cotton cloth,.................................	40
1917	" Gunny,..	75
1918	" Leather, traveling,..........................	50
	" Paper, (see Paper Bags),......................	50
1920	Baking Powders,.....................................	35
1921	Bakers' and Confectioners' supplies, (see No. 2156)..	96
1922	Balata, (see Gums),..	58
1923	Balloons, paper,..	75
1924	" cloth,...	60
1925	Balsam, Peruvian,...	40
1926	Balsams, not elsewhere specified—Copaiva, Upo balsam (Balm of Gilead,) Tolu, Benzoin, Fir,..	50
1927	Bamboo, Calcutta, Poles, Japanese Sticks,........	25
1928	" Furniture, (see also Rattan, No. 2993),....	50
1929	" Splits,....	48
1930	Bananas...	60
	Banjo Strings, (see Catgut Strings)................	
	Barilla (see Carb. Soda, 2069)......................	
	Barium, (see Nos. 1961, 2108, 2894)................	
	Bark, Amazona, (see No. 1855),................ ...	
1931	" Calisaya,..	40
1932	" Cascarilla,......................................	40
1933	" Peruvian,..	40
1934	Barks, Roots and Herbs, (not specified see Roots and Herbs, 3008)............................	40
1935	Barley,..	35
1936	Barytes, (Blanc fixe,).................................	25
1937	Basket Materials,......................................	75
1938	Baskets, Splint,..	60

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
1939	Baskets, Willow,	75
1940	Bathing Suits, if written as Knit Goods, otherwise take charge "Underwear, men's, women's or childrens."	34
1941	Bay Rum, in bbls., casks or puncheons	40
1942	" " " bottles,	45
1943	" Leaves, (see Barks, Roots and Herbs, No. 1934),	50
1944	Beads	45
1945	Beans, Manilla,	72
1946	" Peas or Lentils, other than Castor, Tonca or Vanilla,	35
	Beans (see Castor, Manilla, Tonca, Vanilla,)	
1947	Beef, salt or corned,	20
	Beer, (see Ale, &c., Nos. 1846, 1847),	
	Beet Seeds, (see Seeds)	
1949	Bellows,	50
1950	Bells, large, Church,	30
1951	" small table,	40
1952	Belting, Leather and Rubber,	25
1953	Berries, (see Cranberries, etc.,)	35
1953½	Beta Naphthol,	100*
	" " if stored in Non-Stip. or Chem. W. H.	48
1954	Bicycles,	45
1955	Billiard Balls,	60
1956	" Cues,	30
1957	" Tables,	55
1958	" Table Slates, Marble Slabs,	75
	Binders' Board, (see 1981)	
1959	" Twine in cases,	40
1960	" " in bundles,	75
1961	Binoxide of Barium,	120*
1962	" " " if stored in Non-Stip. or Chem. W. H.	40
1963	Bird Cages,	60
1964	Birds, Stuffed,	100
1965	Bird Skins, raw	68
1966	" Paradise Feathers,	68
1967	Biscuit, (see Hard tack, No. 2461; Crackers, No. 2196,)	40
1968	Bismuth, Oxide,	35
	Bi-Sulphide of Carbon (see Carbon, 2072)	
1969	Bitters, bottled,	45
1970	" in barrels or hhds.,	35
1971	Bitumen, (see Asphaltum, No. 1904,)	100
1972	Blackboards Slate, Composition,	40

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
1973	Black Hypo-sulphate of Lead,	120
1974	" Lead, (see also Lead, black, Plumbago,).	35
1975	" Wool Moreens,	24
1976	Blacking, Shoe,	30
	" Stove, (see Stove Polish, No. 3177,).	
1977	Blankets,	25
1978	Bleaching Powders, (Chloride of Lime,).	100*
1979	" " if stored in Non-Stip. or Chem. W. H.	40
	Blue Vitriol, (see Sulphate of Copper, No. 2168),	100*
	" " if stored in Non-Stip. or Chem. W. H.	28
1981	Board, Binders, (see also Straw Board),	28
1982	Boats, Ordinary,	45
1983	" Rowing Shells,	60
1984	Bolt Rope,	45
1985	Bolting Cloth,	30
1986	Bone Ash,	40
1987	Bone Black, Ivory-Black and Lamp-Black,	100*
1988	" " " " if stored in Non-Stip. or Chem. W. H.	50
1989	" Dust,	40
1990	" goods, combs,	30
1991	Bones,	45
1992	Bonnets,	75
1993	Books, Blank,	45
1994	" Printed, and Periodicals,	45
1995	Boots and Shoes,	25
1996	Borate of Manganese,	100*
1997	" " " if stored in Non-Stip. or Chem. W. H.	48
1998	Borax, in bags,	40
1999	" " casks,	30
2000	" " cases,	35
2001	Bottles,	40
2002	Bottle stoppers,	30
2003	" wrappers,	45
2004	Boxes, fancy, paper, pencil, plush, jewelers',	75
2005	Box-wood, (see Woods),	
2006	Braids and Tassels, (see No. 2357),	60
2007	" Straw and Wood, plain, mixed or fancy,	50
2008	Bran,	48
2009	Brandy, in bbls., (see Liquors, Nos. 2641, 2642,).	70
2010	" in bottles,	80
	Brass and Copper, scrap, (see Junk).	
2011	" " " ware,	20

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
2012	Brazil Nuts, (see Nuts, No. 2765,)................	35
	Brewers' Grains or Sprouts, (see No. 2666),.........	
	Bric-a-Brac, (see Antiquities, Antiques, Curios, etc.).	
2013	Bricks, Bath,.................................	10
2014	" Enameled,.................................	10
2015	" Fire,.................................	5
	Brilliantine, (see Dress Cloths),..................	
2016	Brimstone, or Sulphur,........................	100*
	" if stored in Non-Stip. or Chem. W. H..	48
2017	Bristles, in cases.............................	40
2018	" in casks,.............................	30
2019	Britannia ware,..............................	35
	British Gum, (see Dextrine, No. 2225,)...........	
2020	Bronzes,.....................................	40
2021	Bronze Powders,..............................	50
2022	Broom Corn, in bales,........................	200*
2023	" " if stored in Non-Stip. or Chem. W. H..	85
2024	" Root,.................................	200
2025	Brooms, (Corn,)...............................	60
2026	" Splint,...............................	40
2027	Brushes,.....................................	40
2028	Buckets and pails, wood and paper,...............	50
2029	" " " metal,......................	20
2030	Buckwheat,..................................	35
2031	Burgundy Pitch, (see Pitch,).....................	100
2032	Burial Cases, metal, (see Coffins 2145).............	35
2033	" " wood, (" " 2146)............	75
2034	Burlaps,.....................................	75
2035	Burlap Sacks, in bales,........................	72
	Burnt Work on Wood and Leather, (see Artistic 1899),	
2036	Burr Stones,..................................	40
2037	Butterine,....................................	40
2038	Butter,......................................	35
	Butter of Cocoa, (see Cocoa B. 2138).............	
2039	Buttons, wood, horn, bone, ivory, and pearl, manufactured or in part,....................	35
2040	" cloth covered, or metal,.................	50
2041	Cabinets, Drug, Dye, Instrument, Filing,....	75
2042	Cabinetware, and Household Furniture, new,.......	75
2043	Caffeine, in glass, in cases,......................	58
2044	" " tins cased or tin cans,................	34
2045	Cages, Bird, (see Bird Cages, No. 1963)...........	60
2046	Calcium, Chloride, in drums,....................	20
2047	" " " bbls..........................	30

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
	Calf Skins, ... (see Skins), ...	
	" " dry, in bales, " "	
	" " waxed, ... " "	
2048	Calicoes, Prints and Chintz, ...	25
2049	Calomel, ...	40
	Cambrics, (see No. 2738), ...	
	Camels Hair, (see Hair), ...	
2050	Camomile Flowers, ...	50
2051	Camphor Balls, (see No. 2726), ...	96
2052	" Gum, ...	60
2053	" Wood, for chests, closets &c.	40
2054	Camwood, (also Barwood).	40
2055	Candles	50
2056	Candy, **(see 2155)**	75
2057	Canes, Walking, rough.	35
2058	" " finished	45
2059	Canned Foods, (Vegetables, Meats, Fish, Fruits,)... Note—Canned Goods must be written as Canned Foods.	50
2060	Cannel Coal, protected from weather, moisture &c...	60
2061	" " not protected from " " "	150
2062	Cantharides, "Spanish Flies,"	50
2063	Canvas, ...	20
	Caoutchouc, (see Crude Rubber, No., 2203)	
2064	Capers, ...	40
2065	Capsicum, (see Pepper,)	75
2066	Capsules	55
	Carbolic Acid, (see Acid, No. 1808,)	
2067	Carbolineum Avenarius, ...	120
	Carbonate of Ammonia, (see Ammonia, Carbonate of)	
2068	" " Potash, (see Pearl Ash,)	30
2069	" " Soda, (see also Barilla,)	40
	" " Lime, (see Lime, No. 2628,)	
2070	" " Lithia, ...	120*
2071	" " if stored Non-Stip. or Chem. W. H.	60
2072	Carbon, Bi-Sulphide of, ...	150
	" Silicate of (see Silicate of Carbon), ...	
2073	Card-board, straw, ...	40
2074	" Bristol or enameled, ...	50
	Cards, Panels, Hangers and Calendars, (see Advertising Matter No. 1832),	
	" Playing, (see Playing Cards,)	
	Car Springs, (see Springs, No. 3148,)	
2075	Carboys, empty, ...	25

* Also increases base rate of a Stipulated W. H. if stored therein.

No	MDSE. IN WAREHOUSES, continued	Add to Base rate. Cents.
2076	Carpets, (see Oil Cloths, Rugs,)	30
2077	" Warp,	30
2078	Carriages, Buggies, and Sulkies,	50
2079	Carriage and Wagon materials,	45
2080	" trimmings,	45
2081	Cartridges, see Ammunition,	60
2082	Carts and Wagons,	30
2083	Cassia and Cassia Buds,	50
2084	Castor Beans,	40
	" Oil, (see Oil, No. 2774,)	40
2086	" Pommace, (see Fertilizers),	35
2087	Casts, Plaster,	75
	Catechu, (see also Gambier and Cutch, No. 2213)	
2088	Catgut Strings, (see Banjo and Violin Strings),	60
2089	Caviar,	40
2090	Celluloid, and Zylonite Goods,	100
2091	Cement,	30
	Cereal Foods, (same rate as Infant's and Invalid's Prepared Foods),	
2092	Chains and Chain Cables,	10
2093	Chalk,	25
2094	Chamois Skins,	40
2095	Champagne,	80
2096	Cheese,	35
	Chemicals and Drugs. If this phrase used in Stipulated Warehouse, the following words must be added: "Acids, explosives and poisons excepted." See specific kinds not otherwise specified, (see 2240 and Acids, Drugs, etc.,)	120
	" if stored in Non-Stip. or Chem. W. H.	60
2099	Chemical, Pharmaceutical and Flavoring Extracts, (see Extracts),	
	Cherries, dried, (see Dried Cherries 2236 and Fruit),	
2100	Chewing Gum	60
	Chicle, (see Gums),	
2101	Chicory,	25
2102	" Root,	35
	Children's Underwear, (see Underwear, Ladies' and Children's),	
2103	Chillies, (peppers,)	40
2104	China Clay, Kaolin, (see Earths, 2253)	25
2105	China-ware, Porcelain, Pottery, Parian, Bisque and Majolica Ware and Faience Ware,	45

No.	MDSE. IN WAREHOUSES, continued	Add to Base rate. Cents
2106	Chinese and Japanese goods,	75
2107	Chloral, Hydrate,	120
2108	Chloride of Barium,	120
	" " Calcium, (see Cal. Chl. 2046)	
	" " Lime, (see Bleaching Powders. No. 1978)	
	" " Zinc, (see No. 3378),	
2109	Chocolate,	35
2110	Chow Chow,	30
2111	Chrome Alum,	100
2112	" Yellow,	30
	Church bells, (see Bells No. 1950),	30
2114	" Furniture,	75
2115	" goods, books, ornaments, and images,	75
2116	Churns,	40
2117	Cigars and Cigarettes,	75
2118	" " " in tin lined boxes,	50
2119	Cigarette Paper,	72
	Cinchona and Cinchonidia, (see Quinine No. 2984,)	
2120	Cinnabar, (Vermilion,)	45
2121	Cinnamon,	50
2122	Citron, see Fruit,	40
2123	Civet,	40
2124	Clay,	24
2125	" Cold Water Paints,	38
	Clean Woolen Clippings in bales, (see Rags in bales),	
2126	Cloaks, Mantillas, and womens' cloth outer garments	75
2127	Cloakings, if written as "Woolen and Worsted Cloths," (see No. 3363),	24
2128	If not written as "Woolen and Worsted Cloths" shall take charge for Cloaks, Mantillas, etc., No. 2126,	
2129	Clocks,	40
2130	Clock cases, wood,	60
2131	Clothing, Men's Women's or Children's,	72
	" Oil, (see Oil Clothing),	
2132	Cloths, (see also Bolting Cloths,) woolen, cassimeres beavers, broad cloth, corduroys, satinets, (see Dress Cloths, No. 2232),	25
2133	Cloves,	50
2134	" Stems,	50
2135	Cobalt,	25
2136	Cochineal,	70
2137	Cocoa, Cocoa Beans and Cocoa Shells,	35
2138	" Butter, (see Butter of Cocoa,)	45
2139	" Matting,	50

No	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents
2140	Cocoa, Nuts,	40
	" Nut Oil, (see No. 2775)	
2141	" Nut Shells,	34
2142	Cocoanut, Desiccated,	72
2143	Cocoons, Silk,	40
	Codfish, dry, (see Fish, Nos. 2328,)	
2144	Coffee,	30
2145	Coffins, Burial Cases etc., metal,	35
2146	" " " " wood,	75
	Coir Fibre, ...Fibre rates	
2147	" Yarn,	44
2148	Collars, Cuffs, and Shirts,	45
2149	Cologne Spirits, in bottles, cased or barreled,	50
2150	" " in casks,	40
2151	Coloring for Brandy,	50
	Colors, (see Dry Paints and Colors)	
2152	Combs, horn, bone, ivory,	40
2153	Composition Turnings,	100
2154	Cones, Fir, or Pine,	75
2155	Confectionery, (see Candy, No. 2056)	75
2156	Confectioners' and Bakers' Supplies, (see No. 1921),	
2157	Cooperage, barrels, new, shooks,	50
2158	" old, empty,	100
2159	Copal Gum, (see Gum, No. 2436,)	50
2160	Copperas,	100*
	" if stored in Non-Stip. or Chem. W. H.	28
	Copper, and Brass goods or ware, (see No. 2011)	20
2161	" Carbonate,	120*
	" " if in Non-Stip. or Chem. W. H.	48
2162	" bolts, rivets, nails, rods, tubing,	15
2163	" Ore,	10
2164	" Oxide of,	96
2265	" Pigs, or Ingots,	10
2166	" scale,	30
	" and Scrap Brass, (see Junk),	
2167	" sheets,	15
2168	" Sulphate of, (see Blue Vitriol),	100*
	" " " if in Non-Stip. or Chem. W. H.	28
2169	Cordage, Rope and Twine,	45
2170	Cordials, bottled, in baskets or cases,	80
2171	" in hhds. or bbls.,	70
2172	Cordonnet, charged silks,	100
	Corduroys, (see Cloths),	
2173	Cords, Tassels and Braids, (see Braids 2006)	60

*Also increases base rate of a Stipulated W. H. if stored therein.

MDSE. IN WAREHOUSES, continued.

No.		Add to Base rate. Cents.
2174	Corks,	70
2175	Cork Stone,	38
2176	" Wood,	80
	Corn Oil, in bbls, (see Oil other than Kerosene),	
2177	Cornices, gilt,	60
2178	" wood,	50
2179	" metal,	25
2180	Cornwall Stone,	24
2181	Corsets, packed, and Corset Materials,	60
2182	Corticine, (see Floor Cloth, No. 2344),	35
2183	Cosmetics, Perfumery,	75
2184	Costumes, Theatrical, Bal-Masque,	80
2185	Cottolene, in bbls., or kegs,	45
	Cotton,* in bales,....Fibre rates	
2186	" Batting,	100
2187	" Curtain Nets,	48
2188	" Goods, not colored or printed,	20
2189	" " dyed and printed,	28
2190	" " gray and colored not printed, (2426)	24
2191	" piece goods, colored,	28
2192	" Sacks, in bales,	38
	" Seed Oil (see No. 2779)	
2193	" Ties, metal,	20
	" Velvet, (see Dress Cloths),	
	" Velveteens, (see Dress Cloths),	
	" Warp Flannels, (see No. 2336),	
2194	" Warps, (see Warps),	
2195	" Yarn or Warp,	25
2196	Crackers, (see No. 1967),	40
2197	Cranberries, (see 1953)	35
2198	Crash, (Russia,) (see Linen No. 2635)	25
2199	Cream of Tartar, (see Argols, 1887)	35
	Creosote, (see Kreosote,)	
2200	Crockery, (see China Ware, 2105)	45
2201	Crucibles,	25
2202	Crude Gutta Percha,	10
2203	" Rubber, (see India Rubber,)	10
2204	" Witch Hazel, in bbls.,	38
2205	Crystal Ash,	30
2206	Cubebs,	45
2207	Cudbear,	30
2208	Curiosities, Curios, Antiques, (see No. 1880)	100
2209	Curled Hair, (see Hair, No. 2450)	35
2210	Currants, dried,	30
	Curtain Nets, cotton, (see Cotton Curtain Nets),	

*Also increases base rate of a Stipulated W. H. if stored therein.

MDSE. IN WAREHOUSES, continued.

No		Add to Base rate. Cents
2211	Curtains, lace, and material for same.	50
2212	" and portieres, other than lace,	40
2213	Cutch, (Catechu, Gambier,)	40
2214	Cutlery	50
2215	Cuttle Fish Bone	20
2216	Damask, linen, (see Linen, No. 2635)	25
2217	Dandelion Root	30
2218	Dates	45
2219	Deer and Elk Skins, undressed, (see No. 3103),	20
2220	" " " " dressed, (see Chamois 2094),	40
2221	Degras, (Wool Grease),	38
2222	Demijohns, (empty,)	45
2223	Dentists' materials, tools,	50
2224	Desiccated Cocoanut, (see No. 2142),	
2225	Dextrine, ("British Gum,")	30
2226	Dial Enamel,	20
2227	Disinfecting Fluid,	120*
	" " if in Non-Stip. or Chem. W. H.	70
2228	Doilies, Napkins and Handkerchiefs, (see Napkins)	40
	Dolls, (see Toys),	
2229	Doors, Sash and Blinds, see also Sash and Blinds,	75
	Double Manure Salt, (see Salts),	
2230	Down,	50
2231	Dragon's Blood,	50
2232	Dress cloths, (Alpacas, Cashmeres, Serges, Camels-hair, Ladies' cloth,) Woolen, Cotton, or Mixed, policy to except Silks, Satins and Velvets and Velveteens,	30
	" Goods, (must not be used). (See No. 2232 and general forms end.)	
2234	Dresses, manufactured or in part, (see Tea Gowns),	75
2235	Dried Apricots,	38
2236	" Cherries,	44
	" Flowers, (see No. 2349),	
	" Fruit, (see No. 2358),	50
2238	" Peaches, (see Peaches Dried)	38
2239	Druggists' Sundries, (This broad term would include instruments and cases, patent articles, brushes, combs, corks, scales, shelf-bottles, perfumery, cosmetics,)	75
2240	Drugs and Chemicals, see specific kinds. If this phrase used in Stipulated Warehouse, the following words must be added: "Acids, explosives and poisons excepted."	120
	" " " if in Non-Stip. or Chem. W. H.	60
	See next page	

*Also increases rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
	Drugs and Chemicals, continued	
	See Acids. See Extracts.	
	" Barks. " Gums and Resins.	
	" Chemicals. " Leaves or Herbs.	
	" Druggists Sundries. " Patent Medicines and Proprietary Articles.	
	" Ethers. " Roots.	
2241	Drums, Musical,	60
2242	" Toy,	70
	Dry Goods,† (see specific rates for particular kinds,) and Mdse. class A. and B.	
2243	Dry Lamb Skins, (see Skins),	34
2244	Dry Paints and Colors,	40
2245	Duck,	30
	Dutch Herring, (see Fish, No. 2328).	
2246	Dye Stuffs, see Alizarine, Annatto, Cutch, Cudbear, Gambir, Indigo, Madder, Orchill, Sumac,	50
2247	" " extracts.	35
2248	Dye Woods, ground, in water tight bbls.,	35
2249	" " " " bags or sacks,	60
2250	" " in sticks,	40
	Bar Wood. Peach Wood.	
	Barbary Root. Quercitron Bark.	
	Brazil Wood. Red Sanders.	
	Cam Wood. Red Wood.	
	Fustic. Sapan Wood.	
	Green Ebony. Sumac.	
	Hypernic. Turmeric.	
	Lima Wood. Woad.	
	Log Wood. Weld.	
	Nic Wood.	
2251	Dyed and Printed Cotton Goods and Cotton Warp Flannels, (see Nos. 2232, 2233),	28
2252	Dynamos,	75
2253	Earths, ground, Fullers', Painters', Kaolin, Infusorial	30
2254	Earthenware and Stone Ware,	30
2255	East India Goods,	72
2256	Ebony, (see Woods, No. 3359).	35
2257	Eggs,	50
2258	Egg Albumen,	48
2259	" Yelks,	50
2260	Elaine Oil, in barrels, (see Oils),	38

†The term "dry-goods" may be definite enough for policies covering stocks for sale in stores, where the facts of the case are well known and where the usages of trade and custom limit its significance, but it is too indefinite for insuring goods in warehouses of miscellaneous contents, as an unscrupulous assured might claim that it covered any kind of "dry" merchandise, and have his claim sustained by the average jury.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate Cents
2261	Elecampane root, (see Roots &c., No. 3008).........	35
2262	Electric appliances and apparatus, Carbon points, glass lamps, globes, bulbs.....	75
	Electric Fans, Motors and Apparatus, (see Telephones,)	
2264	Electrical Batteries..............................	60
2265	Electroplates, Stereotype plates, blocked,..........	100
2266	" " " not blocked,.......	60
2267	Electro Silicon,..................................	50
2269	Elephant's Tusks, see Ivory, (No. 2543),...........	35
	Elixirs, Extracts, Fluid, Tinctures, (see Extracts No. 2296),...	
	Elk Skins, (see No. 2219),.........................	
2270	Embroideries,.....................................	50
2271	Emery,..	20
2272	" paper, (see Paper).............................	50
2273	" wheels,..	40
2274	Enamel, Dial, (see Dial No. 2226),.................	
2275	Enameled Leather, (see Leather),..................	38
2276	Enameled ware, (see Agate ware, No. 1834).......	20
2277	Encaustic Tiles, (see Tiles,)......................	35
2278	Engines, Steam (or Steam Fire,) (see No. 2324),......	35
2279	Engravings and Etchings, framed,.................	72
2280	" " " unframed,..............	68
2281	" on wood,..........................	75
2282	" " stone, lithograph, (see Lith. Stones,)	100
2283	Envelopes...	45
2284	Epsom Salts, Sulphate of Magnesium,............	35
2285	Erasers, (Rubber or Steel),........................	58
2286	Ergot,..	45
2287	Essential Oils, in cans,...........................	60
2288	" " " glass..........................	70
2289	" " " iron drums,...................	60
2290	Ethers, Sulphuric,...............................	125*
	N. B. All Ethers must be separately stored remote from fires and never on upper floors.	
2291	" if stored in Non-Stip. or Chem. W. H.......	50
	Evaporated Fruits, (see Fruit No. 2359),...........	
	Excelsior,*...Fibre rates........................	
2293	Explosives, high, for blasting &c., special rate,.....	500*
2294	Extracts, Chemical, Pharmaceutical and Flavoring,.	60
2295	" dry, (see also Dye extracts 2247),.........	35
2296	" Fluid, Tinctures, Elixers, (see Sarsaparilla)	60
2297	Extract Quebracho,...............................	34
	Eyes, Artificial, (see Artificial Eyes 1892),..........	

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
	Eyeglasses, (see Spectacles and E. No. 3141), ...	
2298	Fancy goods, ...	75
2299	" Swisses, (see Dress Cloths), ...	28
2300	Fans, Electric, Motors and Apparatus, (see No. 2262)	
2301	" fancy, paper, lace, ...	75
2302	" Japanese, ...	45
2303	" palm leaf, ...	40
2304	Farina and Potato Flour, ...	44
2305	Feathers, for upholstery, pillows, ...	40
2306	" and bird skins for millinery, ...	70
2307	" Artificial, (see Artificial), ...	
2308	" Dusters, ...	40
2309	" Ostrich, raw, ...	50
2310	" Raw Paradise, ...	70
2311	Feldspar, (see Earths,)	25
2312	Felt, ...	25
2313	Felts, for paper machines, ...	35
2314	Fence wire, Iron, see Iron	20
2315	Fennel Seed, ...	50
2316	Fertilizers, Ammoniacal, animal matter or blood, ...	100
	" Castor Pommace, (see No. 2086), ...	35
2317	" Guano, (see 2432,)	25
2318	" Land plaster, ...	25
2319	" Phosphates, ...	25
2320	" Tobacco dust, ...	35
	Fibre,* Cotton, Esparto grass, Flax, Grass, Hemp, Jute, Manilla, Oakum, Rice root, Sisal, Tampico, Tow, ...	Fibre rates
2321	Figs, ...	50
2322	Filberts, (see Nuts, No. 2765)	45
2323	Files, ...	40
2324	Fire Apparatus, Engines, Hose Carriages, H. & L. Trucks, Extinguishers, (see 2278), ..	40
2325	Fire-arms, in cases, (see Guns and Pistols, 2923,)	45
2326	Fire Crackers, ...	75
2327	" Works, separate storage, ...	500*
2328	Fish, in bbls, kegs or kits, ...	25
2329	" dry, ...	40
2330	" in oil, see Sardines, Shadines, Anchovies, ...	30
2331	" Salt, in brine and pickled, ...	24
2332	" Sounds, ...	25
	" (see Sprats), ...	
2333	Fishing tackle, (see Sporting goods, Nos. 3146, 1906)	50
2334	Flags and Banners, ...	60

*Also increases base rate of a Stipulated W. H. if stored therein.

No	MDSE. IN WAREHOUSES, continued	Add to Base rate. Cents.
2335	Flannels,	24
2336	" Cotton Warp, (see No. 2194),	28
2338	Flavoring Extracts,	45
	Flax, ...Fibre rates	
2339	" Seed, (see Linseed No. 2638),	40
2340	" Velours,	58
2341	Flint,	24
2342	" Pebbles,	24
2343	Flocks, Woolen,	30
2344	Floor Cloth, which includes Oil-cloth, Linoleum and Corticine,	35
	Flooring, (see Parquette Fl. Wood Fl. No. 2872),	
2345	Flour,	34
2346	" in barrels,	25
	" Insect, (see Insect No. 2517),	
2348	" Tapioca, (see Tapioca),	
	" Sago, (see Sago Flour),	
2349	Flowers, Dried, (see Dried Flowers),	58
2350	Fluorspar,	24
2351	Foil, gold and silver,	50
2352	" tin,	35
2353	Food, Infants and Invalids, Prepared and Cereals (see No. 2513),	
2354	Fossils,	50
2355	Frames, gilded, mouldings for mirrors or pictures,	60
2356	Frankincense, (Gum Olibanum,)	40
2357	Fringes, tassels, Gimps, and trimmings see 2006,	60
2358	Fruit, Dried,	50
2359	" Evaporated,	44
2360	" green and ripe, (see Apples, Bananas, Lemons, Oranges, Limes, Pineapples,)	60
2361	" preserved, (see Tamarinds, Figs, Citron 2122	50
2362	Fullers' earth, (see Earths, No. 2253)	20
2363	Fungus,	30
2364	Furnishing goods, mens'	60
2365	Furniture, (see also Cabinet ware, No. 2042)	75
2366	" used, wearing apparel,	100
2367	Furriers Clippings,	100
	Furs, Hatters, (see No. 2469),	
2368	Furs, not specified, undressed,	40
	which would include or cover the more expensive fancy kinds, Beaver, Bear (black, brown, grizzly, white polar), Chinchilla (real, bastard), Ermine, Fox (silver, black, white, red, blue, cross), Fitch, Fisher, Lynx, Lamb (Persian), Leopard, Lion, Marten, Mink, Musk	

No		Add to Base rate. Cents.
	Ox, Ounce or Snow Leopard, Ocelot, Otter (land or sea), Sable (Russian, Kamschatka, Hudson Bay), Seal (Alaska, Shetland, North west Coast, Copper Island, Lobos, Cape Horn, Japanese, Cape of Good Hope), Skunk, Tiger, Wolf, Wolverine.	
2369	Furs, specified, undressed, any of the following cheaper varieties, ...	30
	Astrakhan, Angora, Badger, Black Janet, Cat, Coney, Dog, Fox (grey, Kitt, Japan), Goat, Guanaco, Hamster, Kangaroo, Krimmer, Kolinsky, Lamb (Iceland), Moufflon, Muskrat, Monkey, Nutria, Opossum, Raccoon, Rabbit, Sheep (Iceland), Squirrel, Seal (hair, wool), Thibet, Wombat, Wallaby.	
2370	Furs, Dressed, of the first class No. 2368............	55
2371	" Dressed, " " second class No. 2369.........	45
2372	Gall nuts, (see Nuts, No. 2765)..................	35
	Gambier, (see Cutch No. 2213),....................	
2373	Gamboge, see Gums,...........................	40
2375	Games,..	75
2376	Garancine,.....................................	30
2377	Garden Seeds, (see also Seeds),.....................	160
2378	Garlic,..	44
2379	Gas Lamp fixtures and Chandeliers,..............	35
	Gas logs, (see Terra Cotta No. 3225.)...............	
2380	Gas Machines and Meters (see also Meters,)........	40
2381	Gauges, Steam, (see Steam Gauges),................	40
2382	Gelatine.......................................	35
	General Mdse., see Mdse. and specific rates for kinds.	
2384	Gentian Root, (see Roots, No. 3008)................	50
2385	Gents Furnishing goods, (see Furn. goods, No. 2364)	60
2386	Gin, in bottles, (see Liquors, No. 2640,)............	70
2387	" in bbls., or puncheons,......................	80
2388	Ginger,......................................	40
2389	" Ale,....................................	38
2390	" preserved,..............................	35
2391	Ginseng Root, (see Roots, No. 3008)..............	40
2392	Glass, (Plate,).................................	30
2393	" Ornamental, colored, stained, figured, ground, Leaded,.................................	50
2394	" Rough hammered for skylights, deck,........	20
2395	Glass House pots, (used in manufacturing glass),...	30
2396	" Silvered plates, for mirrors,................	65
2397	" Ware, tumblers and fruit jars,..............	40
2398	" Window,.............................	25
2399	Glassware, Hollow,..............................	48

MDSE. IN WAREHOUSES, continued.

No.		Add to Base rate. Cents.
2400	Glauber's Salts, Sprudel Salts, (see Soda Sulphate)..	30
2401	Gloves, other than Kid, which see No. 2564........	40
	" Schmachen and Lamb Skins, (see No. 2581)..	
2402	Glucose,..............................	35
2403	Glue..................................	35
2404	" Stock..............................	44
2405	Glycerine,............................	35
2406	" in iron drums,.....................	40
2407	Goat Skins, dry, see Hides,........................	35
2408	" " pickled,........................	15
2409	Gold Pens, see also Pens, Gold,....................	30
	" Thread, (see Thread),.........................	
	Goods on storage, (see Merchandise, No. 2693).....	
	Gowns, Tea, (see Dresses 2234, 2706),...............	72
	Grain Bags, gunny or burlap, (see 1917)...........	
	" " cotton, (see 1916)......................	
2415	" Identity Preserved,........................	24
2416	" Malt Sprouts or Brewers',..................	38
2417	" Wheat, Rye, Corn, Barley, Oats,............	25
2418	Grape Juice, in hhds. butts or pipes,...............	34
2419	" " " bottles..............................	80
2420	Grapes,..	50
2421	Graphite, (see Black-lead, No. 1974)................	25
2422	Graphophones and Phonographs,....................	72
2423	" " Records,............	200
2424	Grass Bags,......................................	75
2425	" Cloth,.....................................	75
	Gray and Colored Cotton Goods, not printed, see 2190,	
	Grease, Axle, (see No. 1911),.......................	50
2428	" other than Axle,..........................	48
	" Wool (Degras) (see No. 2221),..............	
2430	Green Kern,......................................	72
2431	Grind Stones,....................................	20
	Groceries,* see specific rate for particular kinds, and and Merchandise class A and B.........	
2432	Guano, (see Fertilizers,)..........................	20
2433	Guava Jelly,......................................	40
	Gummed and Coated Paper, (see No. 2855),.........	96

*The same remarks as to the indefiniteness of the term "Dry Goods" (which see) will apply to "Groceries," which is too broad for insuring goods in public warehouses. High rated, damageable classes might be claimed to be "groceries" because incident to such stocks—matches, spices, oils, liquors, turpentine, etc. An average rate which might be adequate for a grocery stock, where each kind of goods would be only a small percentage of the whole, would not do for a warehouse policy which might cover for its whole amount on a single damageable class.

No.	MDSE. IN WAREHOUSES. continued	Add to Base rate. Cents.
2436	Gums, Acacia, Arabic, Balata, Benzoin, Camphor, Catechu, or Cutch, Chicle, Copal, Damar, Dragons blood, Gamboge, Kauri, LaBiche, Mastic, Olibanum, (Frankincense), Senealg, Shellac, Tragacum, Zanzibar, (see specific rates)........	60
2438	Gun and Musket Barrels..........	40
2439	" Metal Turnings, in casks and barrels,..........	24
	Gunny Cloth and bags, (see No. 1917)............	
2440	Guns and Pistols, (see Fire Arms, No. 2325).........	45
2441	Gun Stocks,..........	40
2442	Guts, (salted,) sausage casings,..........	25
2443	Gutta Gelatong,..........	24
2444	" Percha Cement, exceeding five gallons,.......	150*
	" " Crude, (see Crude Gutta Percha 2202).	
	" " Hard Rubber and Penholders, (see Penholders),..	
2445	Gypsum, or Sulph. Lime, (Plaster of Paris,)........	25
2446	" Rock,..........	20
2447	Hair, Animal, Cow, Goat, Hog,..........	25
2448	" Camels,..........	24
2449	" Cloth,..........	28
2450	" Curled, or rope,..........	24
	" Horse, (see No. 2492),..........	35
2452	" Human,..........	55
2453	" Scoured,..........	24
2454	" Tonic,..........	48
2455	" Work,..........	75
2456	Hams,..........	40
2457	Hammocks,..........	35
2458	Handkerchiefs,..........	40
2459	Handles, Adze, Axe, Rake, Hoe, Scythe Snaths,....	35
2460	Hand Stamps, (see Stamps, No. 3154)...............	35
	Hard Rubber or Gutta Percha Penholders, (see Penholders and 2509),...	
2461	Hard Tack, (see 1967)..........	40
2462	Hardware,..........	50
2463	" Cutlery and edge tools excluded in policy,	40
2464	" House, or "Builders hardware.".........	35
2465	" Saddlery and Harness,..........	30
2466	Harness and Saddlery,..........	35
2467	Hats and Caps, other than straw,..........	35
2468	" Palm Leaf, Leghorn and similar hats made up,	48
2469	Hatters' Furs,..........	28
2470	" goods or materials, hat bands,..........	45

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents
	Hay and Straw, . . . Fibre rates.	
2471	Hayden Sugar.	48
2472	Heaters, Steam and Hot Water.	24
	Hemp, ... Fibre rates.	
2473	Herbs, (see also No. 1934).	50
	Herrings, (see Fish No. 2329).	
2474	Hide Cuttings.	45
2475	Hides, Buffalo, Horse and Colt,	20
2476	" Cow and Ox,	20
	" Deer and Elk, (see Nos. 2219, 2220),	
2478	" Horse, (see No. 2493),	20
2479	" Salted, loose, green, "slaughter",	15
2481	High Wines, see Whiskey,	70
2482	" " if stored in Non-Stip or Chem. W. H.	40
2483	Hollow ware, metal, (see agate, enameled &c.,).	30
	" Glassware, (see No. 2399),	
2485	Hominy,	35
2486	Hones, and Whetstones.	20
2487	Honey,	40
2488	Hoofs and Horns.	20
2489	Hooks and Eyes.	35
2490	Hops,	75
2491	Horn goods, combs,	35
2492	Horse Hair, (see No. 2450),	24
	" Hides, (see No. 2478),	20
2494	" Shoes,	10
2495	Hose—leather, rubber, linen,	20
2496	Hosiery and Knit Goods, (see No. 2568, and Underwear).	35
	Hot Water and Steam Heaters, (see No. 2472).	
2498	House furnishing goods, (see specific rate for Woodenware and Tinware,).	75
2499	Household furniture, new, (see Cabinet, No. 2042).	75
2500	" goods, second hand, see Furniture 2366.	100
2501	Houses, Portable, (see Portable Houses),	58
2502	Hyposulphate of Lead, Black, (see No. 1973),	
2503	Ice Cream Freezers.	35
	Identity Preserved Grain, (see No. 2415),	
2504	Imitation Straw Braid, (see Straw Braid No. 2007).	48
2505	Incubators and Brooders,	40
2506	India or Malacca Joints,	25
2507	India Rubber, crude, (see Crude Rubber No. 2203)	
2508	" " Boots and Shoes,	25
2509	" " Goods, hard,	25
2510	" " " soft, (see Rubber Bands),	30

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
2511	Indigo, in cases, (see Rubber Substitute, &c.).......	35
2512	" " ceroons,..............................	40
2513	Infants and Invalids Prepared Foods and Cereals, (see No. 2353),......	48
	Infusorial earth, (see Earths),......................	
2514	Ink, in bottles,..................................	40
2515	" " bbls.,......................................	30
2516	" Printers',......................................	30
2517	Insect Flour,....................................	48
2518	" Powder,.......................................	48
2519	Insecticide, (London Purple),.....................	120*
2520	Instruments, Optical, Surgical and Mathematical,..	70
2521	Iodine,...	24
2522	Ipecac,...	40
2523	Iron, Bar and Rod,................................	15
2524	" Boiler plates,..................................	25
2525	" Bolts, nuts, rivets, washers,...................	25
2526	" Chain, (see Chain, No. 2092)...................	10
2527	" Castings,......................................	10
2528	" Filings, (used in sawing marble,).............	30
2529	" hoop,..	20
2530	" Old, scrap,....................................	25
2531	" Oxide of,......................................	38
2532	" Pigs,..	10
2533	" Pyrites, see Pyrites,..........................	50
2534	" Railroad, and Spikes,.........................	10
2535	" Railing, Fence work,...	15
2536	" Sulphate of,...................................	28
	" Sulphide " (see Sulphide),.....................	
2537	" Tubes and Pipes,...............................	15
2538	" Ware, hollow, Kettles, (see No 2567)..........	30
2539	" Work, Ornamental, Architectural,.............	38
2540	Isinglass,..	35
2541	Istle Cloth,......................................	75
2542	Italian Cloths and Serges, (see Dress Cloths),........	28
2543	Ivory, Animal tusks, (see also Elephant tusks,)....	35
2544	" Goods, manufactured,.........................	65
2545	" Vegetable, nuts, (see Vegetable Ivory, 3299).	45
2546	Jalap,..	40
	Japanese and Chinese goods, (see Chinese, No. 2106)	
2548	" Crepe,...	72
2549	" Paper,...	38
2550	Jewelry,..	40
2551	" cases and instrument cases,................	50

*Also increases base rate of a Stipulated W. H. if stored therein

MDSE IN WAREHOUSES, continued

No		Add to Base rate Cents
2552	Jewels for mfg. watches and clocks.	40
	Juice, Grape, (see Grape Juice)	
	" Lemon, (see No. 2618),...................	
	" Lime, (see No. 2629),...................	
2553	" Prune,................................	44
2554	Juniper Berries,................................	40
2555	Junk, old,...	200
2556	Jute Boards, Oak Grained,......................	
	" Butts,*......Fibre rates......................	
2558	" Matting, Yarns and other Jute products,........	75
	" Rejection,*......Fibre rates	
	" Rugs, (see Rugs),..............................	
2559	Kainite or Kainit, (Sulph. of Magnes. Potass.).......	30
	Kangaroo and Arabian Hair Sheep Skins, (see 1886),.	
2561	Kaolin, or China Clay, (see Earths, No. 2253).......	25
	Kauri Gum, (see Gums),.........................	
	Kern, Green, (see No. 2430),........................	
	Kernals, (see Nut Kernals),.......................	
	Kerosene* Oil, special rates and separate storage....	
2564	Kid Gloves,...	60
2565	" " in tin lined cases,..........................	50
2566	Kirschwasser,..	50
2567	Kitchen and Cookery utensils,.......................	40
2568	Knit goods, (Underwear and Hosiery, (see 2496)....	35
2569	Kreosote, (see Creosote,)...........................	100*
2570	" if stored in Non-Stip. or Chem. W. H.....	50
2571	Kryolith,..	24
2572	Labels,..	75
	LaBiche Gum, (see Gums),.......................	
2574	Lac Button, (see also Gums, No. 2436) in cases,.....	40
2575	" Dye,..	45
2576	Laces and Lace goods, (see also Curtains, No. 2211).	60
	" Shoe, (see Shoe No. 3075).....................	
2578	Ladies' and Childrens' Underwear, Skirts and Petticoats, (see Underwear),......	50
2579	Lamb Roams,...	38
	" Skins, Dry, (see Skins),..........................	
2581	" and Schmachen Skin Gloves, (see Schmachen and Gloves),...	38
2582	Lamps, glass or part glass,.........................	50
2583	" metal,...	40
2584	Lamp Black, (see Bone Black, No. 1987)............	100*
2585	" " if stored in Non-Stip. or Chem. W. H..	50
2586	" Shades, Glass,...................................	48
2587	" " Paper or Textile Fibre,...............	72

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued,	Add to Base rate. Cents.
	Lanolin, (see Oils),	
2589	Lanterns, paper,	60
2590	" metal and glass,	35
2591	Lard,	40
2592	" Oil, (see also Oils,).	50
	" Stearine, (see Stearine),	68
2594	Lasts,	40
2595	Lathing, metallic,	20
2596	Laundry Blue, in boxes and cases,	38
	Lead, Antimonial, (see No. 1876),	
	" Black, (see No. 1974 Black-lead)	30
2599	" Pencils, boxed, (see also Pencils, No. 2882)	40
2600	" Pigs,	10
2601	" Pipe,	20
2602	" Red,	30
2603	" Sheet,	20
2604	" Shot, (see also Shot),	35
	Leather, Artistic Burnt Work on Wood and, (see No. 1899)	
2606	" Bags and Trunks, (see Bags, No. 1918)	50
2607	" Board,	30
2608	" for Belting, Leather in Hides or Sides, Kips, Rough Leather and Sole Leather,	25
2610	" Grain Leather, Harness Leather, Split Leather, Tanned Calf Skins, and Upper Leather, Lace Leather,	30
2611	" Fancy Leather, and Morocco, Shagreen, Patent, General Shoe Finding Stock, Tanned Kids, Tanned Sheep Skins, General Stock of Fancy Skins for Tanning, Untanned Calf, Goat and Sheep Skins, Alligator, Enameled,	40
2612	" Scraps, Shavings and Skivings,	100
	Leaves, (see Roots, Leaves, etc.,).	
2613	" Buchu,	60
2614	" Rose,	60
2615	Leggings and Overgaiters,	72
	Leghorn, Palm Leaf and Similar Hats made up (see Hats 2468),	
2616	Lemons, Limes, or Oranges, in boxes, (see Oranges,).	50
2617	Lemon Peel, Orange Peel,	35
2618	" Juice,	44
2619	Lentils, (see also Beans,).	35
2620	Licorice, Extract, sticks,	40
2621	" Paste,	40
2622	" Root,	100
2623	Life Preservers, cork,	35

No	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
2624	Lightning Rods, and Fixtures,......	25
	Lignumvitæ, (see Woods, No. 3359)	
2625	Lime,†..	100*
2626	" if stored in Non-Stip. or Chem. W. H.........	60
2627	" Bi-Sulphite of, in bbls.,......................	30
2628	" Carbonate of,....	25
2629	" Juice,....................................	44
2630	" Phosphate of,...........................	40
2631	Limestone, ground,............................	25
2632	Linaloe Oil, in cans, (see Oils),...................	58
2633	" " " glass, " "	70
2634	Lincrusta Walton,...............................	35
2635	Linen, (see Linen Form),.........................	25
2636	" Yarns,......................................	68
	(See form for Linen).	
2637	Linoleum, (see Floor Cloth, No. 2344)..............	35
2638	Linseed, (see Flax 2339),.........................	40
	" Oil, (see Oil, No. 2787).....................	50
2640	Liquors, in bbls., hhds. puncheons, casks, butts or pipes,.........	70
2641	" Wines, Spirits and Cordials; Brandy, Gin, Rum, Whiskey and High Wines, in bottles,	80
2642	" if stored in Non-Stip. or Chem. W. H......	38
2643	Litharge, Oxide of lead,..........................	30
2644	Lithographic Stones, not engraved, see Stones,.....	35
2645	" " engraved,....................	100
2646	" Prints, other than for advertising,.....	68
2647	Lithopone,...	28
2648	Locks..	35
	Logwood, (see Dye woods, No. 2248 &c.)..........	
2649	" Extracts, (see Dye Stuffs 2246),...........	34
	London Purple, (see Insecticide),...................	
2650	Looking glass frames, wood and gilt, (see 2355).....	60
2651	" " plates, (see Glass, No. 2396),.........	65
2652	Lumber, undressed,............................	40
2653	" planed or dressed,.........................	60
2654	Lycopodium,.....	35
2655	Lye, Concentrated,..............................	35
2656	Macaroni or Vermicelli............................	72
2657	Mace,..	50
2658	Machinery, heavy, not easily damaged, Rollers, Iron planers, presses, lathes, vises,...........	30
2659	" delicate, easily damaged, type setting, paging, dynamos,.....................	75

*Also increases base rate of a Stipulated W. H. if [illegible]

†Deduct if skidded, 10%.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
2660	Madder,	30
2661	Magnesia, Carbonate, Magnesite,	35
2662	Mahogany, in logs,	30
2663	" in board or planks,	35
2664	" in veneers,	65
2665	Malt,	40
2666	" Sprouts or Brewers Grain,	38
2667	Manganese, Black Oxide of,	30
2668	" Chloride of,	120*
	" " " if Non-Stip. or Chem. W. H	48
2669	Manikins,	60
	Manilla Grass, ...Fibre rates	200*
2670	" Beans,	72
2671	Mantels, metal,	30
2672	" stone, marble or slate,	45
2673	" wood,	60
	Mantillas, (see No. 2126),	
	Manure Salt, Double, (see Salts),	
2674	Maps,	35
2675	Marble, in blocks, rough,	20
2676	" carved or chiseled, statuary,	75
2677	" Dust,	25
2678	Marbles and Agates, (see also Agates, 1835)	30
	Martingale Rings or Poker Chips made of composition goods, (see No. 2939)	56
2680	Matches, parlor, sulphur,	75
2681	" Safety, requiring prepared friction surface	40
	Mathematical Instruments, in cases (see Ins. 2520),	
	Mats or Matting, vegetable fibre or straw matting,	
2683	" India Rubber,	25
2684	Matting Coir,	75
2685	Mattresses,	40
2686	Meats, preserved or pickled, in tin or glass, (see 2059,)	35
	" Pickeled, in barrels and tierces, (see No. 1947)	24
2687	Medicines, (see Drugs, No. 2240)	100
	" Patent, (see pat. med.)	50
2689	Meerschaum, uncut,	30
2690	" pipes,	75
2691	Melado,	25
2692	Menthol,	120
2693	MERCHANDISE,	150

Policy must contain following clause:

This policy shall not attach, apply or cover any merchandise insured specifically.

Note.—Merchandise covers packages containing same such as boxes, barrels and labels.

*Also increases base rate of a Stipulated W. H. if stored therein.

MDSE. IN WAREHOUSES, continued. Add to Base rate.

No. Cents.

2694 Merchandise, Form A.

Add 60 cents to Base Rate of Warehouse.

On Merchandise, the property of the assured or held by the assured in trust or on commission or sold but not delivered, while contained in (insert location and description of warehouse) This policy does not cover, attach or apply to any of the following:

Acids, ammunition, artificial flowers or feathers, celluloid goods, chemicals, cigars, cigarettes, drugs, electrical goods, explosives, fibre, fireworks, naval stores, oils, oiled clothing, photographers' supplies, patterns, petroleum or petroleum products, poisons, rags, tobacco, toys and zylonite goods.

This policy shall not attach, apply to or cover any merchandise insured more specifically or more generally than this policy covers.

2695 Merchandise, Form B.

Add 45 cents to Base Rate of Warehouse.

On Merchandise, the property of the assured or held by the assured in trust or on commission or sold but not delivered, while contained in (insert location and description of warehouse.) This policy does not cover, attach or apply to any of the following:

Acids, ammunition, antiques, artificial flowers or feathers, artists' materials, bags, bagging, burlaps, celluloid goods, chemicals, cigars, cigarettes, Chinese and Japanese goods, cotton batting, curiosities, curios, drugs, druggists' sundries, electrical goods, electro plates, explosives, fans, fibre, firecrackers, fireworks, flags or banners, frames gilded or carved, fruits (green or preserved,) furnishing goods, grass cloth, gums, herbs, hops, instruments, kid gloves, laces, leaves, liquors, matches, matting, meerschaum goods, millinery, mirrors and mirror plates, models, music boxes, musical instruments, naval stores, needles, negatives, oils, oiled clothing, optical goods, patterns, petroleum or petroleum products, photographers' supplies, photographs, pictures plants, plush goods, poisons, rags, ribbons, roots, shoddy, seeds, spices, statuary, straw goods, theatrical properties and scenery, tobacco, tonqua or vanilla beans, toys, toilet articles, trimmings, watch springs, wood or willow ware, wines and zylonite goods.

This policy shall not attach, apply to or cover any merchandise insured more specifically or more generally than this policy covers.

Mercury, (see Quicksilver 2982)

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents
	Metal Antimony, (see Antimony),	
2696	" Goods, not elsewhere specified,	70
	" Paper, (see 2857)	96
2698	" Sheathing,	20
2699	Metals, unfinished, pig, ingot, block, &c.,	10
2700	Meters,	40
2701	Mica,	20
2702	" pulverized,	15
2703	Military Goods,	60
2704	Milk, Condensed, (see Canned Foods,)	30
2705	" Sugar of, (see Sugar of Milk),	48
2706	Millinery Goods, (see Artificial Flowers, Bonnets, &c.)	75
2707	" Ornaments,	72
2708	Millstones, (see Burrstones, No. 2036)	40
2709	Mineral and Aerated Waters, in bottles,	40
2710	" " " " " bbls. or hhds.,	35
2711	" Wax,	38
2712	" Wool,	10
2713	Mirrors, (see Glass, silvered, No. 2396)	65
2714	Models and Patterns,	75
2715	Mohair, (refer to "Angora Wool" and not the dress cloth known as Alpaca),	45
2716	" Yarn,	20
2717	Molasses or Syrup,	25
	Molybdate of Ammonia, (see No. 1862),	120*
2719	Monuments, Bronze and Metal,	40
2720	" Stone, Carved, (see Tombstones,)	75
	Moreens, Black Wool, (see No. 1975),	24
	Morocco, (see No. 2611),	
2722	Mosaic pattern and design work,	70
2723	" tile, (see Tiles,)	40
2724	Moss, for upholstery, ...Fibre rates	75*
2725	" edible, Irish, Iceland, &c.,	45
2726	Moth, Naphtha and Camphor Balls,	96
2727	Mother of Pearl, Shells,	25
2728	Mouldings, Cornices, gilt, (see Cornices, 2177)	60
2729	" " " metal, No. 2179	25
2730	" " " wood, No. 2178	50
2731	Mucilage, in bottles,	35
2732	" " bbls.,	25
2733	Mushrooms,	45
2734	Music Boxes,	75
2735	" Sheet,	60
2736	Musical Instruments, (see Pianos 2905, Organs 2830)	60

*Also increases base rate of a Stipulated W. H. if stored therein.

No	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents
	Musical Instruments, piano actions, (see No. 2906),..	100
2738	Muslins and Cambrics,..........................	24
2739	Muslin Underwear, (see Underwear),..................	34
2740	Mustard, dry,..................................	45
2741	" Seed,................................	45
2742	Myrbane, Oil of, in drums,......................	150*
2743	Myrrh, gum.................................	35
2744	" Tincture................................	40
2745	Nails,..	25
	Naphtha,* (special and separate storage,)..........	
2746	" Naphthaline, Moth and Camphor Balls,...	96
	Napkins, Doilies and Handkerchiefs, (see 2228, also linen form),..	
2747	Naval Stores,* (see also Tar, Rosin and Turpentine,)	100
	Neatsfoot Oil, (see Oils, No. 2790)................	40
2749	Needles, hand or sewing machine,................	75
2750	Negatives, Photographic,........................	175
2751	Nets, Cotton Curtain,............................	48
2752	" and Netting,............................	40
2753	Nickel,..	15
2754	" Oxide,..................................	28
2755	Nitrate of Soda, (Chile saltpetre,)................	125*
2756	" " " if stored Non-Stip. or Chem. W. H	50
2757	Nitre Cake,......................................	100
2758	" " if stored in Non-Stip. or Chem. W. H...	50
2759	Nitro-Benzol, (a substitute for Bitter Almonds in Confectionery,)........................	150*
2760	" if stored in Non-Stip. or Chem. W. H.	75
2761	Noils, Silk, (see Silk Waste and Noils),............	50
2762	Noodles,..	40
2763	Notions, Yankee,................................	75
2764	Nursery Stocks, plants, bulbs, (see also Plants,).....	100
2765	Nuts, (Betel, Brazil, Cashew, Chestnuts, Gallnuts, Hazel, Kola, Peanuts, Pistachio,)............	45
2766	Nut Galls,......................................	45
2767	" Kernals or Shelled Nuts,.....................	60
2768	Nutmegs,..	50
2769	Nux Vomica,....................................	45
	Oak grained Jute Board, (same as Straw Board),....	
	Oakum,*......Fibre rates........................	
2770	Oatmeal,..	40
2771	Ochre, (see also Earths, No. 2253)................	30
2772	Oil Cake,..	40

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents
2773	Oil, (other than Kerosene, which see) Amber, Bergamot, Caraway Seed, Cod, Corn, Cotton, Lanolin, Olive, Palm, Rape Seed,	60
	Oil, Aniline, (see No. 1874½),	
2774	" Castor,	40
2775	" Cocoa Nut,	50
2776	" Cod liver, in glass,	40
2777	" " " " bbls.,	30
2778	" Corn, in barrels,	48
2779	" Cotton seed, in bbls.,	50
2780	" Cotton seed in glass, table oil,	40
2781	" Elaine, in bbls,	38
2782	" Essential, (see No. 2287)	60
2783	" " in iron drums, (see 2289)	58
	" Foots, Olive, (see No. 2817),	
2785	" Kerosene, (special rates and separate storage)	200*
	" Lard, (see No. 2592)	50
	" Linaloe, (see 2632),	
2787	" Linseed, (see No. 2638),	50
2788	" Lubricating,	40
	" of Myrbane, in drums, (see No. 2742),	150*
2790	" Neatsfoot,	40
2791	" Oleo,	48
2792	" Olive, in baskets, cans or Cases,	40
2793	" " " bbls. or casks,	40
2794	" " " bottles or tins,	38
2795	" Palm, in bbls.,	48
2796	" " " tin or glass, boxed,	35
2797	" " Kernal,	48
	" Peppermint, in cans, (see No. 2889),	
	" " " glass, (see No. 2890),	
2799	" Sesame, (same rates as 2792, 2793, 2794),	
2800	" Sod,	38
2801	" of Spearmint, in cans,	58
2802	" " " " glass,	70
2803	" Sweet, in bottles and cases,	38
2804	" Tallow,	48
2805	" Tanners',	48
2806	" Vegetable,	50
2807	" Wood,	48
2808	" Whale and Fish,	40
2809	Oil Cloth, (see Floor-Cloth, No. 2344)	35
2810	Oiled Clothing,	100
	Old Rubber Scraps, (see No. 3012),	24

*Also increases base rate of a Stipulated W. H. if stored therein.

MDSE IN WAREHOUSES, continued

No.		Add to Base rate. Cents.
2811	Old Steel Rails,	10
	Oleo Oil, (see No. 2791),	48
2814	Oleomargarine,	40
2815	Olives, in bottles,	50
2816	" " kegs, bbls., or hogsheads,	40
2817	Olive Oil Foots,	36
2818	" Wood, (see Woods, No. 3359)	40
2819	Olive Wood goods, from Syria, in boxes,	75
2820	Onyx,	28
2821	Opium, in cases, tin lined or drums,	40
2822	" " " not tin lined,	60
2823	Optical and Mathematical Instruments, (see Instruments, No. 2520)	70
2824	" Goods,	70
2825	Orange & Lemon Peel, (see Lemon, No. 2617)	40
2826	Oranges, (see Lemons, No. 2616)	50
2827	Orchill Weed,	45
2828	Ore,	15
2829	" Chrome,	14
2830	Organs, (see Musical Instruments, No. 2736)	60
2831	Oriental and Turkish Goods,	72
2832	Ornaments, Millinery,	72
2833	Ostrich feathers, (see Feathers for millinery, No. 2306)	70
2834	" " Raw, in tin lined cases,	50
2835	Overgaiters and Leggings,	72
	Oxalate of Potash, (see Potash),	96
	Oxide of Copper, (see No. 2164),	96
	" " Iron, (see No. 2531),	38
2836	" " Nickel,	28
2837	" " Tin,	28
2838	Ozokerite,	38
	Packages; It shall be permissible to make an endorsement as follows; "This policy also covers packages containing the above described merchandise and labels thereon."	
2839	Paintings, Pictures, Panoramas, (may add and their frames),	75
2840	Paint, oil,	50
2841	" dry, (see Dry P. No. 2244)	40
2842	" Driers, liquid, (except petroleum products,)	100
2843	Paint Pots,	35
	Paints, Clay Cold Water, (see No. 2125),	38
	Palm Kernel Oil, (see Oil),	48
2844	" Leaf, in cases,	30
2845	" " " ceroons,	35
2846	" " " bundles,	40

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
	Palm Leaf, Hats made up, (see Hats No. 2468),.....	
	Pampas Plumes,......Fibre rates.................	
	Panama Hats, (see No. 2468),.....................	34
2847	Paper Bags, (see Bags, Paper, No. 1919)...........	50
2848	" Balloons, No. 1923.........................	75
2849	" Blotting..................................	50
2850	" Boxes and tubes,...........................	50
2851	" Building..................................	35
	" Cigarette, (see No. 2119)..................	72
2852	" Clippings or Pressed Paper, in bales,.........	100*
	" Emery, (see Emery Paper, No. 2272).........	50
2854	" Glazed, Enameled, same as Paper Hangings,..	100
2855	" Gummed or Coated,........................	96
2856	" Hangings, wall paper,.......................	100
	" Japanese, (see No. 2549),...................	38
2857	" Metal,.....................................	96
2858	" Pails, (see No. 2028)......................	40
	" Patterns, (see Patterns, No. 2874)............	100
2859	" Printed Sheets and Bound Books,............	96
	" Printing, in rolls, (see No. 2966),............	38
2860	" Pulp,.................................. ..	40
2861	" Rice,.....................................	72
2862	" Sand, same as Emery,......................	50
2863	" Stock, (see Rags, No. 2989)	200
2864	" Wax, (see Paper Glazed, Enameled,..........	96
2865	" Wrapping, Manilla,........................	35
2866	" Writing, Flat, News, Book, Printing, Tissue and Toilet, (see Printing in rolls)...	38
2867	Paraffine,...	40
2868	Parasol and Umbrella Sticks,.....................	45
2869	Paris Green,......................................	125*
2870	" " If stored in Non Stip. or Chem. W. H..	40
2871	" White, (see Whiting)......................	25
2872	Parquet Flooring,............................. ...	50
2873	Patent Medicines, (see Medicines, No. 2688).........	50
2874	Patterns, Paper,.................................	100
2875	" Wooden,.............................	100
2876	" Metallic,............................	60
	Peaches, Dried, (see No. 2238),...................	38
2877	Peanuts, (see Nuts, No. 2765)	45
	Pearl Ash, (see Carbonate of Potas., 2068)..........	30
2879	" Shells,...................................	25
2880	Peas, (see Beans, No. 1946)......................	30
2881	" Preserved,..............................	35

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate Cents
	Pebbles, Flint, (see No. 2342)..	24
	Pencil Boxes, (see No. 2004), ...	72
2882	Pencils, (Lead) (see Lead Pencils, No. 2599)........	40
2883	Penholders, ...	58
	" Hard Rubber or Gutta Percha, (see 2509)	24
2884	Pens, Gold, (see Gold Pens, No. 2409).............	30
2885	" Steel, (see Steel Pens,)......................	50
2886	Pepper, Berries, (see No. 1953),..................	34
2887	" Ground,......................................	72
2888	" Shells,......................	34
2889	Peppermint Oil, in cans,....	58
2890	" " " glass,.......................	70
2891	Pepsin,..	80
2892	Percaline, (see Dress Cloths),...................	28
2893	Perfumery, and Cosmetics,.........................	75
2894	Peroxide of Barium,...............	120*
2895	" " " if in Non-Stip. or Chem. W. H..	40
2896	Persian Berries,..................................	45
	Peruvian Bark, (see Bark, No. 1933)...............	45
2898	Petroleum barrels,* (empty,)......................	100
2899	" special rates and separate storage,.......	200*
	Petticoats and Skirts, (see Underwear),............	50
	Pharmaceutical, Chemical and Flavoring Extracts, (see Extract, No. 2294)..	120
	Phonographs and Graphophones, (see No. 2422),....	72
	" " " Records, (see 2423)	192
	Phosphate of Ammonia, (see No. 1864),.............	24
	" " Soda, (see No. 3125),.................	48
2900	Photographs,......................................	75
2901	Photographers' materials, excluding Dry Plates,....	75
2902	" Dry Plates,.....................	200
2903	Phosphorus, in tins, hermetically sealed,..........	300*
2904	" if stored in Non-Stip. or Chem. W. H.	100
2905	Pianos, (see Musical Instruments, No. 2736)........	60
2906	" actions, (see No. 2737)......................	100
	Pickled Fish, (see Fish 2331),.....................	
	" Meats, in barrels, (see Meats),...............	24
	" " " tins or glass, (see Meats),.........	34
	" " " tierces, (see Meats),...............	24
	" Sheep Skins, (see Sheep Skins), ...	
2908	Pickles, in barrels,..............................	30
2909	" in bottles,...........	40
2910	Picture Frames, (see Frames, No. 2355).............	60
	Piece Goods, Colored Cotton, (see Cotton),..........	

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
2911	Pig, metal, (see Copper, Iron, Lead, Tin, Zinc,).....	10
2912	Pimento, (allspice,) (see Spices, No. 3144).........	60
2913	Pins,..	30
2914	Pine apples,..................................	50
2915	Pipe, Burnt Clay,..............................	25
2916	" Copper or Brass,.........................	15
	" Iron, (see Iron No. 2537)...................	15
	" Lead, (see Lead Pipe, No. 2601.............	20
2919	Pipe clay, (not clay pipe or pipes,)................	20
2920	Pipes, Smoking, made of clay,....................	40
2921	" " Brier Root, Cob or Wood,.........	45
	" " Meerschaum, (see Meersc. 2689, 2690)	75
2923	Pistols, (see Fire arms No. 2325)..................	45
2924	Pitch, (see also Asphaltum, No. 1904)..............	100
2925	Plants, (see Nursery Stocks, No. 2764)..............	100
2926	Platina,......................................	25
2927	Plaster of Paris,...............................	25
2928	" Wall,..................................	25
2929	" Casts, (see Casts, No. 2087)................	75
	Plates, Electrotype, Stereotype, blocked, 2265.......	100
	" " " not " 2266........	60
2932	Plated Ware, Silver,............................	40
2933	Playing Cards,.................................	45
2934	Plows,.......................................	30
2935	Plumbago, (see Lead Black, 1974)................	30
2936	Plumbers' Supplies,............................	30
2937	Plush goods,...................................	60
2938	Pocket Books, ...	50
2939	Poker Chips and Martingale Rings, made of Composition Goods,	56
2940	Poppy Seed,...................................	45
2941	Pork, Salt,....................................	20
	Portable Houses, (see No. 2501),..................	58
	Porto Rico Tobacco, (see Tobacco),................	100
2942	Postage Stamps, Cancelled,......................	160
2943	Potash, Acetate,...............................	35
2944	" Bi-Carbonate of,.........................	28
2945	" Bichromate,..............................	35
2946	" Bi-Oxalate of,...........................	96
	" Carbonate, (Pearl Ash, which see, No. 2068).	30
2947	" Caustic (Hydrate,)........................	25
2948	" Chlorate of,.............................	150*
2949	" " if stored Non-Stip. or Chem. W. H	50
	" continued next page,......................	

*Also increases base rate of a Stipulated W. H. if stored therein.

MDSE. IN WAREHOUSES, continued

No.	Potash continued,	Add to Base rate. Cents
2950	" Chloride of, or muriate	100*
2951	" " " if in Non-Stip. or Chem. W. H.	50
2952	" Cyanide of,	100*
2953	" " " if in Non-Stip. or Chem. W. H.	40
2954	" Iodide,	50
2955	" Nitrate,	
2956	" Oxalate of,	96
2957	" Permanganate,	60
2958	" Sulphate, (see Kainite, No. 2559)	30
2959	" Yellow Prussiate of,	96
2960	Potassium Hydrate,	120
2961	Potatoes,	40
2962	Potato Flour, Farina and,	44
2963	Precious Stones, (see Jewels for Watches, No. 2552)	60
	Preservatives, Atlas, (see No. 1907),	160
	Preserved Fruits, (see No. 2361)	
	Prints, Chintz, and Calicoes, (see 2048, also general form),	
2964	" in Portfolios,	125
	Printed Cloths, (see forms end)	
2965	Printers' Ink, (see Ink, No. 2516)	30
2966	Printing Paper, in rolls,	38
2967	Prunes, in bags or baskets,	40
2968	" " barrels or casks,	30
2969	" " boxes,	35
2970	" " glass, in cases,	35
	" Juice, (see No. 2553),	44
2971	Prussia Blue,	60
	Prussiate of Soda, (see Soda),	120*
	" " " Yellow, (see Soda),	120*
2972	Pulleys, wooden,	45
2973	Pulp Board,	38
2974	Pumice Stone,	25
2975	Pumps, wood,	45
2976	" metal,	25
2977	Pump Castings,	24
2978	Punk,	72
2979	Putty	35
	Pyrites, (see Iron Pyrites, No. 2533)	
2980	Quaker Buttons, (Strychnine Seed),	72
2981	Quartz,	24
	Quebracho Extract, (see No. 2297),	34
2982	Quicksilver, in iron flasks,	30
2983	" in glass, boxed,	60

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued	Add to Base rate. Cents.
2984	Quinine, Cinchona and Cinchonidia in glass,† in cases,	60
2985	" " " " in tins cased, or tin cans,	35
2986	Quilts of down or feathers,	40
2987	" cotton,	45
2988	Quills and tooth picks,	35
	Rabbit Skins, (see Furs 2369),	
2989	Rags and Clean Woolen Clippings, in bales,	150*
2990	" loose,	200*
	Rails, (see Steel Rails),	
2991	Railing, Iron or Brass, (see No. 2535)	15
2991½	Railroad Iron and Spikes,	5
	Railway Supplies, (see specific kinds,)	
2992	Raisins,	40
2993	Rattan, (see Bamboo, 1927),	20
2994	" Core,	48
2995	" Goods and furniture, (see also Bamboo, 1927).	50
	Raw Bird Skins, (see Bird Skins),	
	" Paradise Feathers, (see No. 2310),	
2996	Red Precipitate,	60
2997	Refrigerators,	75
2998	Regalia, Masonic, Odd Fellows, and other society,	50
2999	Rennet,	40
3000	Resin or Rosin, Pine,	100*
3001	" other than pine, (see Gums, No. 2436)	60
3002	Rhubarb,	35
3003	Ribbons,	60
3004	Rice,	25
3005	" Meal, or Flour,	35
	" Paper, (see Paper No. 2861),	72
3006	" Root (fibre rates),	100
3007	Rods, Wire,	14
	Root, Broom, (see No. 2024),	200
3008	Roots, Leaves and Herbs, (not elsewhere specified,)	50
	N. B. For lower specific rates, see Angelica, Chicory, etc.	
	Angelica, see 1871, Flag, Sarsaparilla,	
	Buchu, Jalap, Sassafras,	
	Canagre, Orris, Seneca,	
	Chicory, see 2101, Ramie, Snake,	
	Elecampane, see 2261, Rose, Valerian, &c.	
3009	Rotten Stone,	25
3010	Rubber Bands, (see No. 2510),	28
3011	" Coloring,	38

*Also increases base rate of a Stipulated W. H. if stored therein.

†Broken glass would render Quinine valueless.

No	MDSE. IN WAREHOUSES continued	Add to Base rate. Cents.
	Rubber Erasers, (see No. 2285),	
3012	" Scraps, Old,	24
3013	" Substitute,	40
3014	Ruches and Ruffles,	65
3015	Rugs, Camels hair, woolen,	35
3016	" Jute,	72
3017	Rules, Measuring,	40
	Rum, (see Liquors, Nos. 2640, 2641)	
	" Bay, (see No. 1941)	40
	Russia Sheetings, (see Sheetings, No. 3064)	25
3020	" Iron,	38
	Sacks, Burlap, (see Bags, 1917),	72
	" Cotton, (see No. 1916),	38
3021	Saddlery and Harness, (see No. 2466)	35
	Saddlery and Harness Hardware, (see H'dware, 2466).	30
3023	Safes, Iron,	30
3024	Safflower,	45
3025	Saffron,	45
3026	Sago,	45
3027	" flour,	45
	Sal Ammoniac, (see Ammoniac, 1867,)	25
3028	Saleratus,	40
3029	Salmon, (see Fish, No. 2328)	38
3030	Salt Cake, (Glaubers Salts, No. 2400)	30
3031	Salt,	45
	Salts, Aniline, (see No. 1874),	120
3032	" Sprudel,	28
3033	" Double Manure,	96
3034	Saltpetre, (see also Nitrate Soda, No. 2755)	125*
3035	" if stored in Non-Stip. or Chem. W. H.	50
3036	Sal Soda,	30
	Sandal Wood, (see Woods,)	
	Sand Paper, (see Paper, No. 2862)	50
	Sardines, Anchovies, Shadines, No. 2330	30
3039	Sarsaparilla,	45
3040	" Extract,	45
3041	Sash, Doors and Blinds, (see Doors & Blinds, No. 2229)	75
3042	Sassafras,	45
3043	Satin, White,	80
3044	Satinets, (see Cloths No. 2132),	28
	Satins, (see Silks,)	
3045	Sauce, Catsup and table condiments,	40
	Sausage Casings, (see No. 2442),	24
3046	Saws,	40

*Also increases base rate of a Stipulated W. H. if stored therein.

MDSE. IN WAREHOUSES, continued.

No.		Add to Base rate. Cents.
	Scale, Copper, (see No. 2166),	30
3047	Scales,	40
3048	Scenery, and Theatrical Properties,	200
	Schmachen and Lamb Skin Gloves, (see No. 2581),	38
3049	Scientific Instruments, (see Instruments, No. 2520)	70
	Scoured Hair, (see Hair No. 2453),	
3050	Scrap, Brass and Copper, (see No. 2555),	120*
	" " " " if in Non-Stip. or Chem. W. H	40
	" Lead, in bbls,	120*
	" " if stored in Non-Stip. or Chem. W. H.	40
3051	Sealing Wax,	40
3052	Seeds, (This includes any of following),	160
	Anise, see 1873, Cotton, Millet, Beet, Fennel, Mustard, Canary, Field, Poppy, see 2940, Caraway, Flax, see 2339, Rape, Cardamom, Garden, Sunflower, Clover, Grass, Timothy, Coriander, Hemp, Wormseed, see 3366, Linseed, see 2638,	
	NOTE. Germinating seeds, which are claimed to be worthless after passing through a fire because of the suspicion of injury which would deter planters from buying them, would be covered by the general term "Seeds." Those seeds which like Flax seed, Anise, etc., are not intended for planting, are provided for by specific rates.	
3053	Seeds, Garden, Flower &c., (see Garden Seeds, 2377)	160
3054	Seneca Root, (see Roots &c., No. 3008)	45
3055	Senna,	45
	Sesame Oil, (see No. 2799),	
	Sewer Pipe, (see Pipe, No. 2915)	
3056	Sewing Machines and parts, except Needles, (No. 2749 which see,)	40
	Shades, Lamp, glass, (see No. 2586),	48
	" " paper or textile fibre, (see No. 2587),	72
3057	Shawls, (lace) (see Lace No. 2576),	58
3058	" if written as "Cloth Shawls"	28
3059	Shavings or chips, for Brewers or Vinegar Mfrs.,	100
3060	Sheep Skins, (see Skins),	30
3060½	" " Pickled	30
3061	Shellac, (see Gums,)	50
	Shells, Cocoa, (see No. 2141),	34
	" Pearl, (see No. 2879),	25
	Shelled Nuts, (see Nuts Shelled and Nut Kernels)	60
3064	Sheetings, (see Cotton Goods, No. 2188)	20

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES continued	Add to Base rate. Cents.
3065	Shingles, Wood,	50
3066	" Metallic,	15
3067	Shirt Waists, Men's,	44
3068	" " Womens' or Childrens',	58
3069	" " and Shirt Waists Suits, Washable,	44
3070	Shirtings, (see No. 2148),	44
3071	Shirts, Collars and Cuffs, (see Collars and C. No. 2148)	45
3072	Shoddy,	150
3075	Shoe Laces or Strings,	56
3076	" Pegs,	30
	Shoes (see Boots and Shoes, No. 1995)	25
	" Horse, (see No. 2494),	10
	Shot, lead, (see also Lead No. 2604),	35
	Shovels, Spades, Forks and Garden Tools, (see 1837),	40
3079	Show Cards, glass,	60
3080	" " other than glass, (see Advertising 1831),	70
3081	Show Cases,	60
3083	Sicilians,	28
3084	Signs, glass, (see Advertising Matter, No. 1832),	75
3085	" metal,	40
3086	" Terra Cotta,	45
3087	Silex,	25
3088	Silica,	25
3089	Silicate of Carbon,	96
	Silicon, Electro, (see No. 2267),	
3090	Silk Artificial, (see No. 1896),	58
3091	" Cocoons, in cases, (see Cocoons, No. 2143)	40
3092	" goods, Satins and Velvets (may add "Silk" before Velvet if desired),	60
3093	" " " and Velvets, if policy contains following clause "value not to exceed $2 per yard," (a water damaged, cheap silk will usually sell for as much as one costing $8 a yard,)	40
3093½	" and Woolen, and Silk and Cotton, mixed Cloths, not exceeding $2 per yard in value may be insured under the following form with a charge of 40 cents viz; "On Silk and Woolen and Silk and Cotton, Mixed Cloths, value not to exceed $2 per yard."	
3094	" Raw,	30
3095	" Spun,	58
	" Thread (see Thread),	
	" Thrown, (see Thrown Silk),	
3096	" Waste and Silk Noils, (see No. 2761),	50

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
3097	Silk Yarn,	58
	" " Artificial, (see No. 1896))	
	Silver plated ware, (see Plated Ware 2932)	40
3098	" solid ware,	30
	Sisal Grass,*......Fibre rates	
3099	Skates, Ice,	50
3100	" Roller,	40
3101	Skewers or toothpicks,	35
3102	Skins, Undressed, other than Bird, (which see)	34
3103	" Deer or Elk, (see Goat Skins, Hides, &c.,)	20
3104	" Waxed Calf,	38
	" see Sheep and 1886,	
	" Calf,	24
	" Dry Lamb, (see 2243)	
	" Kangaroo, (see 1886)	
	" Rabbit, (see 2369)	48
	Skirts and Petticoats, (see 2578)	
3105	Slates, School,	30
3106	" Roofing,	20
3107	Sleighs, large, driving,	50
3108	" small, toy sleds, (see Toys),	60
3109	Slippers,	35
3110	Snake Root, (see Roots, No. 3008)	45
3111	Snuff,	50
3112	Soap,	40
3113	" Stock,	75
3114	" Stone, (Talc,)	25
3115	" Weed, or root,	40
3116	Soda Ash,	30
3117	" Bicarbonate,	30
3118	" Bichromate of,	34
	" Carbonate of, (see 2069)	
3119	" Caustic, (Hydrate of,)	20
3120	" Chlorate of,	100*
3121	" " " if stored, Non-Stip. or Chem. W. H.	50
3122	" Crude,	30
3123	" Crystals, (Sal Soda,)	30
3124	" Hypo sulphite, and Sulphate of, (Glauber's Salts,) (No. 2400)	30
	" Nitrate,* (see No. 2755)	
3125	" Phosphate of,	48
3126	" Prussiate of,	120*
3127	" " " if stored, Non-Stip. or Chem. W. H.	80
	" see next page,	

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE IN WAREHOUSES, continued	Add to Base rate.
	Soda, continued.	Cents.
	" Sal, (see Sal Soda, No. 3036)........................	30
3129	" Silicate of,..	20
3130	" Yellow Prussiate of,........................	120*
3131	" " " " if stored, Non-Stipulated or Chem. W. H..	80
3132	" Fountains and fixtures,........................	45
3134	Sodium, Hydrate, in glass bottles,................	120*
3135	" " if stored, Non-Stip. or Chem. W. H	80
	" phosphate, (see No. 3125)..................	48
	Sod Oil, (see Oil 2800),............................	38
3137	Solder,..	20
	Sounds, Fish, (see Fish Sounds, No. 2332)	25
3139	Spades, Shovels, Manure and Hay Forks, (see 1837),.	40
3140	Sparklets,..	120
3141	Spectacles and Eyeglasses,........................	50
3142	Spelter, (see Zinc,)..................................	15
3143	Spermaceti,..	60
3144	Spices, (not specified),..............................	50
	See Cinnamon, " Cloves, " Ginger, " Mace, " Nutmegs, " Pepper, " Pimento or Allspice,	
	Spirits and Wines, in hhds, butts or pipes, (see Nos. 2640, 3345),......	70
	" " bottles, (see No. 2641, 3346),..............	80
3145	Sponges,..	30
3146	Sporting Goods, (see Athletic Goods, Fishing Tackle &c., Nos. 1906, 2333),............	50
3147	Sprats, in cases,......................................	38
3148	Springs, Car, India Rubber, (see Car Springs),......	25
3149	" Carriage or Wagon, of Steel,..............	35
	" Watch, (see No. 3326)..................	100
3151	" Spiral Steel, in barrels,..................	34
	Sprouts, Malt or Brewers Grain, (see No. 2666),.....	38
	Sprudel Salts, (see Salts),..........................	28
	Spun Silk, (see Silk),..............................	58
3152	Squills,..	50
3153	Stamped Metal Ware,................................	25
3154	Stamps, metal, dating,............................	35
3155	" India Rubber,................................	45
	" Postage, Cancelled, (see No. 2942)..........	
3156	Starch,..	45

*Also increaser base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
3157	Stationery,	60
3158	Statuary, marble or stone,	75
3159	" Bronze, (see No. 2020).	40
3160	" Parian, Bisque, (see No. 2105).	55
3161	" plaster,	75
	Steam Engines, (see Engines, No. 2278, 2324).	35
	" Gauges, (see Gauges, No. 2381).	40
	" and Hot Water Heaters, (see No. 2472),	24
3164	Stearine, (see Lard),	70
3165	Steel,	45
3166	" ingots and bars,	25
	" pens, (see Pens, No. 2885).	50
3168	" Rails,	10
3169	Sticklac,	40
	Stone, Lithographic, not engraved, (see Lith. S. 2644)	35
	" " engraved, (see Eng., No. 2645)	100
3172	" Marble, Onyx, Jasper, or Granite, rough,	20
3173	" " " " " " dressed bld'g stone,	25
3174	" Marble, Onyx, Jasper, or Granite, cut or carved in ornamental designs, (see Statuary,)	75
	" Pumice, (see Pumice Stone, No. 2974).	25
3176	" Ware, (see Crockery, Earthenware, &c.,).	40
3177	Stove Polish or blacking, solid,	40
3178	" " " " liquid,	100
3179	Stoves, Stove castings, parts and pipe,	25
3180	" furniture, (see Kitchen Utensils, No. 2567).	40
	Straw, (Fibre rates).	
3181	Straw Board, (see also Jute Board No. 2556).	30
	" Braid, (see No. 2007).	50
	" " Imitation, (see No. 2007),	48
3183	" Covers, in bales,	44
3184	" Goods,	70
3185	" Hats, not made up, (see Nos. 2468, 2470),	48
	" " made up, (see No. 2468).	
	Straw and Wood Braid, plain, mixed or fancy, (see No. 2007),	
	Strychnine Seed, (see No. 2980).	72
3187	Stuffed Animals, Birds, (see Taxidermy, No. 3215).	100
3188	Sugar,	40
	" Hayden, (see No. 2471).	48
3190	" of Milk,	48
3191	" (or Acetate) of Lead,	50
3192	Sulphate of Alumina,	40
	" see next page,	

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
	Sulphate of, continued	
	" " Ammonia, (see No. 1865),	
3193	" " Antimony,	120*
3194	" " if stored, Non-Stip. or Chem. W. H.	48
	" " Copper, (see No. 2168),	
3195	Sulphide of Iron,	28
3196	Sulphur & Brimstone, (see Brimstone, 2016)	100*
3197	Sumac,	50
3198	Suspenders,	50
	Sweet Oil, in bottles or cases, (see Olive Oil or Oil No. 2794),	38
	Swisses, Fancy, (see Fancy Swisses No. 2299),	
3199	Table Cloths, (see General Linen form),	50
3200	Tacks, iron,	25
3201	" copper,	20
3202	Tags, Paper,	35
3203	" Tin,	20
3204	Tailors' Linings and Trimmings,	58
	Talc, (Soapstone, which see No. 3114)	25
3206	Tallow,	75
	" Oil, (see No. 2804)	48
3208	Tamarinds, preserved,	40
	Tampico* fibre, ... Fibre store rates	
	Tanners' Oil, (see No. 2805)	48
3210	Tapioca,	56
	" Flour, (see No. 2348)	48
3211	Tapestries,	50
3212	Tar, (see Naval Stores, No. 2747)	100
3213	Tarpaulins,	30
3214	Tartaric Acid,	50
3214½	Tartar Emetic,	34
3215	Taxidermy, Animal and Bird Specimens, Stuffed,	100
3216	Tea Gowns, (see Nos. 2234, 2706),	72
3217	Teak Wood, (see Woods, No. 3359)	
3218	Teasels,	40
3219	Teas,	35
3220	Teeth, Artificial, (see Artificial Teeth, 1897)	35
3221	Telephones,	70
3222	Tents, (see Awnings and Tents, No. 1910)	50
3223	Terra Alba, (see Earths, No. 2253)	20
3224	" Cotta, for Building purposes,	20
3225	" " gas logs,	40
3226	" " ornaments,	45
3227	" " signs,	45
3228	" Sienna, (see Earths, No. 2253)	25

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued,	Add to Base rate. Cents.
3229	Terra Umber, (see Earths, No. 2253)................	25
3230	Theatrical Scenery & Properties, (see Scenery, 3048)	200
3231	" Costumes, (see Costumes 2184.)..........	80
3232	Thorium Nitrate,..................................	120*
3233	Thread, other than Tinsel and Gold,...............	30
3234	" Gold,.................................	72
3235	" Silk,..................................	28
	" Tinsel, (see Tinsel 3245),.................	72
3236	Thrown Silk,......................................	58
3237	Tiff,..	40
3238	Tiles, decorated art,.............................	35
3239	" drainage,.................................	15
3240	" galvanized iron,..........................	20
3241	Tin, block,..	10
	" Foil, (see Foil, No. 2352)....................	35
3243	" Plate..	40
3244	" Ware, (see Kitchen Utensils 2567)............	30
3245	Tinsel and Tinsel Thread,.........................	72
3246	Tobacco, Leaf, Foreign,...........................	100
3247	" " Domestic,.........................	80
3248	" " " in hhds.,.................	60
3249	" Chewing,.............................	45
3250	" Plug, Nugget or Twist,................	35
3251	" Porto Rico,...........................	100
3252	" Smoking,.............................	100
3253	" Stems,...............................	40
3254	Tobacco and its Products, this item may be used if written at the highest charge named under 3246 to 3253,..	
3255	Toilet Articles, (see Druggists' Sundries, No. 2239)..	75
3256	Tombstones, (see Monuments, No. 2720)............	75
	Tonic, Hair, (see No. 2454),.......................	48
3257	Tonqua or Tonca Beans,............................	75
3258	Tools, steel, edge, (see also Files, No. 2323, 1837)....	40
3259	" iron or other metal than steel, (see 1837),......	35
3260	Tortoise Shell Goods, manufactured,...............	75
3261	" " unmanufactured,...................	40
	Tow,* Russia, &c.,......Fibre rates................	
3262	Towels and Towelings, (see Linen and Linen form),.	24
3263	Toys and Dolls,...................................	100
3264	" if specifying Hobby horses, wagons, sleds, velocipedes, (see Sleighs),....................	70
3265	Traveling Bags, Satchels (see also Bags, 1918)......	50
3266	Trees,..	100

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents.
3267	Tricycles, (see Bicycles, No. 1954)...................	45
3268	Trimmings, Braid, Gimp, (see Nos. 2006, 2357),.....	60
3269	Tripoli...	20
3270	Trunks..	50
3271	" filled with wearing apparel (see Household Furniture, No. 2500)......................	100
3272	Tubs, wooden,..................................	40
3273	" porcelain, wash, bath,.......................	40
3274	" iron, enameled,.............................	20
3275	Turkish and Oriental Goods,......................	72
3276	Turmeric, (see Dye Woods, No. 2248),.............	45
	Turnings, Composition, (see No. 2153),.............	100
	" Gun Metal, in casks and barrels, (see 2439)	24
3278	Turpentine,.....................................	100*
3279	Twine and Cord, (see Cordage, No. 2169)...........	45
3280	Type,...	50
3281	Typewriters,....................................	50
3282	" supplies, ribbons, carbon paper,.......	75
3283	" Cabinet stands,......................	50
3284	Ultramarine,.....................................	40
	Umber, (see Terra Umber No. 3229)................	25
3285	Umbrellas, and Parasols,.........................	35
3286	" sticks, ribs,..........................	45
3287	" Stands, or holders, metal,..............	30
3288	" " " " wood,..............	40
3289	Underwear, Mens', Womens' or Childrens' (see 2578)	50
	" Muslin, (see No. 2739),.................	
3290	Utensils, Farm and Garden, hand only, (see No. 1837 and Tools,..	40
3291	Upholstery Goods, (see Down, Feathers,)...........	50
3292	Urinals, crockery,................................	40
3293	Valerian, (see Roots, No. 3008)...................	45
3294	Valises, (see Trunks, No. 3270)...................	50
3295	Vanilla Beans,....................................	75
3296	Vanilla Extract,..................................	40
3297	Varnish,..	75
3298	Vaseline,...	60
3299	Vegetable Ivory, Nuts, (see Ivory Veg. 2545).......	45
3300	" " goods,.........................	100
3301	Vegetable roots, Onions, Potatoes, Turnips, in bbls., or bags,.........................	45
	" Oils, (see Oils),........................	
3302	Vegetables, in brine,..............................	28
3303	Veilings,...	58

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued,	Add to Base rate. Cents.
3304	Velocipedes, Childrens, (see Toys,)...............	70
	Velours, Flax, (see No. 2340),.....................	58
	Velvets, (see Silks,)............................	
3305	Velveteens, (see Dress Cloths).....................	28
3307	Veneers, (see No. 2664),...........................	65
3308	Venetian Blinds,.................................	60
3309	" Red,..	45
3310	Verdigris,..	40
3311	Vermicelli and Macaroni, (see Macaroni, 2656).......	35
3312	Vermilion, (see Cinnabar, No. 2120)................	45
3313	Vinegar,..	30
	Violin Strings, (see Catgut, No. 2088),..............	
	Vitriol, Blue, (see 2168),.........................	
3314	Vises,..	20
3315	Wagons and Carts, (see Carts and Wagons, No. 2082) (see also Carriages, No. 2078)....	30
3316	Walnuts, (see Nuts, No. 2765).......................	35
3316a	Warehousemen on accrued charges shall take a rate arrived at by adding 35 cents to the base rate of the W. H. if written specific. If blanket form is used rate for the entire policy must be that of the highest rated risk covered.	
3316b	Warehousemen's errors and omissions policies shall take a rate based upon a charge of 50 cents being added to base rate of each warehouse covered, it being understood that such policies need not have the 80% Co-insurance Clause attached, provided that a specific amount attaches within each warehouse or building covered. If a blanket form is used rate for the entire policy must be that of the highest rated risk covered.	
3316c	Warehousemen's furniture and fixtures and tools and implements used in his business..................	50
3317	Washing Machines,................................	40
3318	Warps, Cotton,....................................	25
3319	Washboards,......................................	72
3320	Waste, (Clean, Woolen, Cop),........................	100*
3321	" Woolen or Cotton including Noil other than Silk,..................	200
3322	" Wool Yarn,....................................	200*
3323	Watches and Watch Movements,......................	50
3324	Watch Cases,......................................	35
3325	" Crystals,.....................................	45
3326	" Springs, see Springs,...........................	100
	Waters, Aerated in bottles, (see 2709),..............	38
	" " " bbls. or hhds., (see No. 2710),....	34

*Also increases base rate of a Stipulated W. H. if stored therein

No.	MDSE. IN WAREHOUSES, continued,	Add to Base rate. Cents.
3327	Wax, Bees,	40
3328	" Figures,	100
3329	" Mineral,	38
3330	" Paper,	96
	" Sealing, (see Sealing Wax 3051),	
3331	" Vegetable,	40
	Waxed Calf Skins, (see Skins),	
3332	Weather Strips,	75
3333	Whalebone,	20
3334	Wheelbarrows,	40
3335	Wheels,	40
3336	Whetstones, (see Hones, No. 2486)	20
3337	Whips,	50
3338	Whiskey and High Wines, in bottles,	80
	" " " " " Octaves and Quarters,	
3339	" " " " " puncheons or bbls.,	70
3340	" " " " if stored, Non-Stip or Chem. W. H.	40
3341	White Lead,	40
3342	Whiting, (see Paris White, No. 2871)	25
3343	Willows and Reeds,*	70
3344	Willow ware,	75
3345	Wine, in hhds., butts bbls, casks or pipes,	40
3346	" " bottles,	80
3347	Wines, Liquors, Spirits and Cordials, in bbls., hhds., butts, casks or pipes,	70
3348	" " " and Cordials, in bottles,	80
3349	Wine-lees, in bags,	34
3350	Window Shades and fixtures,	50
3351	Wire, Iron,	35
3352	" Brass, Copper, Aluminum, Platinum,	20
3353	" Work,	25
	" Fence, (see No. 2314),	20
3354	" Rope or Cable,	25
	" Rods, (see Rods),	
3355	Witch Hazel, Crude in barrels,	38
	Womens' clothing, see 2126, 2131	
3356	Wood Carpeting, mats and flooring,	50
	" Oil, (see No. 2807)	48
3357	" Pulp,	40
3358	" " Plates, Dishes and Platters,	72
3359	Woods of value,	40
	See Woods next page	

*Also increases base rate of a Stipulated W. H. if stored therein.

No.	MDSE. IN WAREHOUSES, continued.	Add to Base rate. Cents
	Box, see No. 2005, Camphor, see No. 2053, Chestnut, Ebony, see No. 2256, Lignum Vitae, Mahogany, see No. 2662, Olive, Rosewood, Sandal, Teak, and other valuable woods.	
3360	Woods, Rough sticks of Wild Chestnut,............	40
3361	Wooden ware, see Tubs, Pails, Baskets,............	75
3362	Wool,..	15
	" Yarn Waste, (see Waste),....................	
3363	Woolen and Worsted Cloths, (see No. 2132),........	25
3364	" Clippings, Clean,.........................	96
3365	Woolen Mixed Cloths not exceeding $2 per yard,....	40
3366	Wormseed, (see Seeds, No. 3052)..................	50
3367	Yankee Notions, (see Notions, No. 2763)...........	75
3368	Yarn, Woolen, Linen or Cotton,..................	20
3369	" Angora Worsted, (see No. 1872).............	24
3370	" Artificial Silk,............................	58
3371	" made of Jute, Sisal, Manilla, Flax, China, Esparto or Malta Grass,....................	50
3372	" Mohair,.....................................	20
3373	" Silk,.......................................	58
3374	Yeast Cakes,....................................	60
3375	Yellow Berries,.................................	50
	" Prussiate of Potash, (see Potash),..........	96
	" " " Soda, (see Soda),...............	120
3376	Ylang Ylang,....................................	58
3377	Zanzibar Gum,...................................	58
3378	Zinc, Chloride,.................................	96
3379	" Dust,.......................................	125*
3400	" Oxide,......................................	28
3401	" Pigs, or slabs,.............................	10
3402	" Sheets,.....................................	20
3403	" Spelter,....................................	15
3404	" Sulphate,...................................	20
3405	" White, in barrels,..........................	14
3406	Zylonite Goods, (see Celluloid,)..................	75

*Also increases base rate of a Stipulated W. H. if stored therein.

General Forms which may be used.

The following forms were prepared in the New York Fire Insurance Exchange to meet the convenience of merchants dealing in certain lines of goods, and have been carefully worded so that, at the rate named for them, they could not be construed to cover merchandise for which higher rates are specified in the list.

"On Paper, Printed Sheets and Bound Books," may be written at 96 cents.

"On Printed Cotton Piece Goods; Calicoes" may be written at 28 cents.

"On Cotton Goods, dyed and printed and also in the gray and on Linen," may be written at 28 cents. (See 2188, 2189, 2190).

"On Wool, Cotton Cloth and Cotton Velveteens," may be written at 28 cts.

"On Woolens, Worsteds, Mixed Cloths and Satinets—This policy does not include Silks, Satins or Velvets," may be written at 28 cents.

"On Wines and Liquors in bottles, barrels and casks and Olive Oil in bottles and tins," may be written at 80 cents.

"It is understood and agreed that any floating policies held by the assured are not to be considered as contributing insurance in case of loss under this policy."

LINEN AND JUTE FORM.

Add 40 cents to Base Rate of Warehouse.

On Manufactures of Linen, of Linen and Jute, of Jute, of Cotton, of Cotton and Linen, and of Cotton and Jute, the property of the assured or held by said assured in trust or on commission, or sold but not delivered while contained in

... .

This policy does not cover, attach or apply to any merchandise above enumerated the value of which exceeds $2.00 per square yard; nor does this policy cover Awnings, Banners, Braids, Burlaps coated or backed for wall decorations, Carpets, Comforters, Cord, Cordage, Cotton batting, Curtains, Flags, Fringes, Gimps, Labels, Gunny bags, Laces, Mattings, Nettings, Quilts, Rove bagging made of jute, Rugs, Tassels, Tents, Twine, Velours, Window shades, Yarns, or Articles of Wearing apparel.

This policy shall not attach, apply to or cover any merchandise insured more specifically or more generally than this policy covers.

Other insurance permitted without notice until required.

Attached to and forming part of Policy No................Insurance Co.

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